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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

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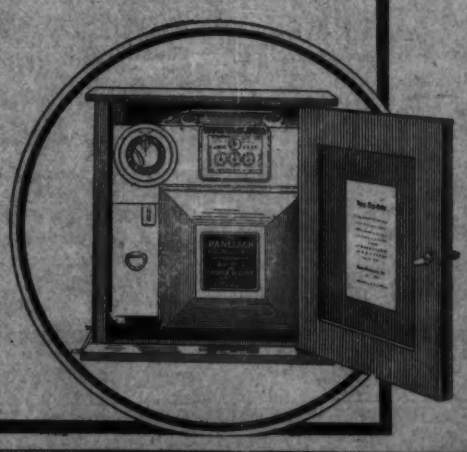

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VOL. CLXIII., No. 3141.] WEDNESDAY, JULY 25, 1923. [75TH YEAR.

EDITORIAL NOTES.

Cultivating a Better Understanding.

GAS companies have hitherto adopted rather a conservative policy in their dealings with municipal authorities; and the latter have very largely pursued a policy of antagonism towards the former. It is a strange position, seeing that gas companies are public utility concerns, and their prime commodity is something which is indispensable to-day. The politic rôle for municipal bodies is to be of as great assistance as possible to gas undertakings in rendering public service, and not to interpose in their activities as much hindrance as they can. The attitude of hostility has become intensified since local authorities have become purveyors of electricity in cities and towns where the competing supply of gas remains in the possession of private enterprise. This sort of thing should not be allowed to continue. It has been going on far too long. Efforts should now be made, if they have not been made before, to create a better understanding; and one way of doing this is to bring the municipal authorities into close contact with gas companies' operations behind the scenes, so as to educate them in the facts relating to the service that is being rendered. The perusal of annual accounts does not do what actual contact with the operations of the concern will do. Financial and working statistics are not particularly interesting or illuminating. In the case of the London Companies, huge figures are presented, which tell of magnificent businesses in point of size; but the municipal authorities who have certain statutory powers in respect of the working of gas companies know very little, if anything, of all that has to be accomplished before those figures are produced. Did they know this—know of the vast amount of work that has to be carried out from pithead and delivery of the coal at the works to the coursing of the gas through the consumers' pipes for the multifarious purposes for which it is used, and of the exacting amount of care and control needed in respect of the numerous processes involved in carbonization of coal and in dealing with the several products—they would realize that this is a serious business, demanding administrative and managerial ability of a high order, technical skill, and acumen in trading not only in gas, but in the secondary products. All this is necessary to two important ends—the rendering of public service at the lowest possible cost, and the paying of a dividend on the capital employed, which dividend is statutorily regulated, and has, through the operation of the sliding-scale, a definite relation to the price of gas.

The Governor (Mr. D. Milne Watson) and the Board of the Gas Light and Coke Company have recognized the need for gas companies and municipal authorities and members of Parliament knowing more of each other. Above all, it is the local authorities who require to have greater cognizance of the work of the gas companies, in order to create and foster a better understanding. The gas companies cannot blame local authorities for having such scant acquaintance with their internal operations, because they have done so little to bring them into contact with them. The administration of the Gas Light and Coke Company therefore determined to make a start in altering this condition; and they hope and believe that the possession of more knowledge will create a new atmosphere, which will be a benefit to all concerned—local authorities, consumers, and stockholders. It must be so. Smooth running is an essential to the best results in any kind of business. Industrial and commercial work—particularly in these times—have inherent difficulties more than sufficient to harass the administrators, without (as in the case of gas concerns) the constantly obsessing feeling that the body governing local affairs are suspicious, and ever on the *qui vive* for opportunities for attacking the suppliers of gas. It is a point for reflection that—though the Gas Light and Coke Company stand as the pioneers of public gas supply, with their immense works at Beckton and elsewhere, and with mains under the streets of an enormous square mileage of the Metropolis—never, so far as is known, have the local authorities, during the Company's six-score years' existence, been invited till now to inspect the works and operations. At any rate, the Governor of the Company, last Tuesday week, after a luncheon which succeeded an enlightening inspection of the Beckton works and the processes, stated that "he believed "this was the first occasion on which they had been thus "visited by a party representing the municipal life of "London in all its phases. The Board felt it was "high time that some of the gentlemen connected with "London's municipal life should see the works which "supplied them with gas—especially as many of these "bodies were themselves purveyors of electricity, and "from time to time some quite uncomplimentary things "were said about the older competitor—gas." There are these and many other reasons for the visit of representatives of the City of London, London County Council, other municipalities, and members of Parliament. The chief reason of all is that the governing representatives of local affairs should be better versed as to the enormous responsibilities and work associated with this public service by private enterprise, which knowledge must show them the care that is taken in serving as economically as possible a public need. The responsibilities have been, if anything, increased by the advent of the Gas Regulation Act, which enjoins local authorities strictly to observe the more stringent testing conditions which are laid down for them as representing the public interests.

It was a large and interested party who accepted the invitation to visit Beckton. It was an innovation, giving an occasion, which could not be resisted, to learn more about this great public service. The visitors were amazed at all they saw; and the magnitude, the variety of processes, and the infinite detail were impressive. They were there to see what many of them had never had an opportunity of witnessing before; and the gas interests of London and all concerned in them are better off to-day than they were previously because of the new enlightenment that exists in many influential quarters. It does not require a Beckton to educate in this way. But Beckton is Beckton; and magnitude does assert itself to the eye and in the ear. They saw there how the sciences of engineering, chemistry, and physics are combined for the purposes of economical and efficient working—from the handling of the coal onwards, through the numerous processes, to the final issues in primary and secondary products. So efficient, too, has become scientific control in a properly ordered large works that, as the visitors were made aware, uniformity in the qualities of the primary and secondary products can be assured from hour to hour and from day to day, given like quality in raw materials and freedom from accident, to which all are subject. It is this scientific control that enables, for example, the calorific value of gas from day to day to show a line of testing results that deviates little from a margin-of-safety point above the declared value. The

same in respect of purity. Were it not for this system of scientific control, gas-works could be the seats of material waste, variable gas quality, and indifferent service. Another thing that must have struck the visitors besides those matters to which attention has been called, is that the ramifications of the operations on a large gas-works demand fairly intimate knowledge of other branches of engineering besides the one which can be described as purely gas engineering. They saw an extensive railway system, a water-clarifying plant, electricity generating plant, and magnificent machine-equipped workshops which are kept busy with the repair and replacement work provided by the huge Beckton plant. They saw how efficiency and public service demand that a large gas-works shall be practically self-contained in all things.

All who took part in the visit have a better understanding to-day than before as to the almost innumerable claims involved in gas administration and management; they know, too, that the work is not carried on in any perfunctory manner, but that it involves a huge system, with at every point direction and control of no mean order. There has been fairly frequent complaint as to a want of due recognition of the position of the gas industry in the general scheme of national provision. The fact is the gas industry has been too modest and reserved. It has not asked men in prominent place in public affairs to come and look upon this and that; and so they judge our importance by the street lamp-post, the incandescent burner, the gas-cooker, the gas-fire, and the water-heater, and in industry by the gas-engine and gas-furnace. Not knowing of our large doings apart from application of the primary product, who can blame them for their judgment? The example of the Gas Light and Coke Company in this matter is something to be commended. Let the local authorities know more of our internal operations. It can do no harm; it will do much good. There is nothing of which to be ashamed; there is much of which to be proud. Above all things, the spreading knowledge will be to the general gain of the industry.

Mr. Brearley Explains.

It always has been, and always will be, that men view things from different standpoints, and each man believes that his standpoint is the correct one, and that what he sees should be similarly described. But, of course, all cannot be right, nor can be their observations. It will be remembered that upon the submission for adoption of the annual report and accounts of the Council at the recent meeting of the Institution of Gas Engineers, a question was raised by Mr. W. B. M'Lusky as to the removal of the name of Mr. John H. Brearley from the list of members of the Gas Heating, Lighting, and Ventilating Research Committee; and he might have added from the Livesey Professorship Advisory Committee. It was then emphatically declared that the deletion of Mr. Brearley's name was not due to any personal feeling; and it was explained that it is necessary occasionally to revise the constitution of the Committees, in order that the existing Council, being responsible to the members, shall have adequate representation. Mr. Brearley was not present at the meeting; and, as he considers he has not been fairly treated in the matter, we have afforded him accommodation for presenting to the members of the Institution the history of his association with the Committees—with the first during some sixteen or seventeen years—and of his official dissociation from them, without being apprised of the fact.

We accept unreservedly the explanations given at the Institution meeting; we sympathize with Mr. Brearley. As a result of the disclosures in the letters which he reproduces in his communication, we suggest to the Council of the Institution that they should revise their procedure in this matter of dispensing with the services of a member of a Committee entrusted with important work, and so introduce into it a little more courtesy. In this affair, we are not prepared to take one side or the other. We do not believe any discourtesy was intended to Mr. Brearley; but there is no doubt that an old practice is at fault, and in a manner which is accentuated now that Committees are engaged on matters that require as far as possible continuity of service from those who possess special qualifications for the work. It seems from the correspondence that the first intimations Mr. Brearley had that his name had been removed from membership of the Committees were through letters from Prof. Cobb and (a day later) from Prof. Smithells, in which they regretted his severance from the work, and acknowledged the value of his services. The Institution had communicated to Prof. Cobb that Mr. Brearley's name had been removed from the Committees, and that a member of the Council had been elected in his stead. After so many years' service, it would have been courtesy to intimate officially to Mr. Brearley himself that the change had been effected. But it appears that "it is not customary for notices to be given." The sooner that custom is altered, the better. To say the least, it is a singular proceeding to discharge a man from service on a Committee after many years' membership, without informing him that this has been done.

At the Institution meeting, the value of Mr. Brearley's work on the Committees was recognized; it was also previously acknowledged in the correspondence that had taken place. Both Prof. Cobb and Prof. Smithells, in their letters, referred to its value. A man who has made a special study of a subject undergoing investigation, and has himself conducted research into it, must be of value to the responsible Committee. With time, he accumulates knowledge which other men may not possess, and that accumulation has good service in the deliberations upon the courses to be pursued in relation to a particular research. The Royal Society believe so much in securing men permanently for research who show special aptitude for it that they are devoting to that purpose the proceeds of Sir Alfred Yarrow's munificent gift of £100,000 [*ante*, p. 304]. We believe they are acting wisely in doing this. The same thing applies to men assisting in directing research. There should be no light parting with a man from a Committee engaged on research who has special qualifications for, or has acquired knowledge of, the subjects undergoing investigation. No comparison is being made, even inferentially, as to the qualifications for the work of Mr. Samuel Tagg (the new President) and Mr. Brearley. There are not, however, such a number of men available specially competent for such work that Committees need become unwieldy. We commend both this point and the one previously made to the consideration of the President and the Council of the Institution. It is regrettable that the matter has cropped up in a form which unhappily makes it a somewhat personal one; but it is hoped that good will result from it by bringing about what we believe to be a necessary amendment in procedure.

In the Coal Market.

The present position of the coal market is far from being free from obscurity. The European situation which has been largely dominating the coal business of this country is at present unchanged; and there is nothing visible which can encourage confidence as to an early transformation. At the same time, exports to the Continent have lately declined; and it is the European export trade that has caused the British coal industry to "pick-up" in its volume of business so considerably during the past six months, while shipments further afield are still much below those of the corresponding period of 1913. The household coal trade at home is not what the collieries and the retailers could wish it to be for this season of the year. Householders are not so keen to-day on the practice of filling their coal-cellars—no doubt partly because they are not so dependent upon solid fuel as they were at one time. The stocking of coal they now largely leave to those transmitters of fuel underground—the gas undertakings; they learned during the war and the great coal strike that there can in times of difficulty be greater reliance upon them than upon the retailers' coal-carts. Then industry is still remote from its pre-war status; and the metallurgical coke industry is not yet working at normal capacity. Therefore, the coal markets can show abundant reason for the quieter conditions which now prevail. While sellers, in view of their much contracted horizon, are not prepared to commit themselves too heavily ahead, they are welcoming with open arms gas undertakings which are prepared to enter into contracts. There is an environing uncertainty which makes the assured and fairly even business of the home gas undertakings something not to be despised.

Gas undertakings have reverted very largely to the contract system, and so are now buying less in the shape of spot parcels, unless there is something going at attractive rates. In making these contracts, the old order of conditions has altered considerably. Change begets change; and those that have come about in gas supply have neces-

sarily transformed the terms of coal purchases to some extent. During the past half-year, quotations for coal have been somewhat higher than those with which the year commenced; but the quotations that are to-day circulated as the market ones are not of the adamant kind that defies a little bargaining and consequent reduction. For the best qualities of gas coal, business has been done at 1s. to 1s. 6d. per ton—there may be cases which show more—below the published quotations; and purchases of second-class qualities have been reported at 2s. to 2s. 6d. per ton below the rates that have been taken for first-class qualities. This is the present condition, notwithstanding that prices have been higher during the past six months than they were formerly.

The coal position has been, as already indicated, largely in favour of the collieries during the first half of this year, owing to the position of the export business; but June saw a substantial shrinkage in the volume of coal shipped. How materially the foreign branch of the trade has affected conditions will be seen when it is stated that in the six months the previous record for coal exports—in 1913—has been beaten by 4,282,646 tons. The total amount exported in the past half-year was 39,808,881 tons, compared with 35,526,235 tons in the June half of 1913—the increase representing 12 p.ct. Of course, the conditions have been unprecedented and artificial, and can only be more or less temporary. But how long the "temporary" state is going to last cannot be estimated, even approximately. However, there is the fact that, though the European position has undergone no change, the requirements of the Continent from this country are not what they were a few weeks ago. In the half-year, France was the biggest buyer with 9,510,176 tons; Germany took no less than 7,964,236 tons; and Belgian needs were more than three times those of the first half of 1913. It is clear from a comparison of the figures applying to other countries that, if there was a change for the better in the European situation, the complexion of the British export coal trade would change very materially. By the way, the average price of coal of all sorts shipped in June was £1 7s. 2d., as compared with £1 7s. 10d. in May, and £1 2s. 4d. in January. This shows the course of the markets during the half-year—the peak average export price being in May, the lowest price in January, and the drop commencing in June.

In the final month of the half-year, there was a big set-back in the total quantity of coal shipped—the figure of 6,588,651 tons being upwards of 1 million less than in May. The value of the total coal exported during the month was £8,950,779. Of the June exports, 725,195 tons were gas coal; the value being £924,885, or an average of £1 5s. 6d. per ton, compared with £1 5s. 1·25d. per ton in May. As already mentioned, the total coal exported in the half-year was 39,808,881 tons, which was 12,624,921 tons more than in the corresponding period of 1922. The gas coal sent abroad in the half-year amounted to 4,648,214 tons, compared with 3,848,780 tons in the June half of 1922—or an increase of 799,434 tons. The total value of the exported gas coal in the six months was £5,629,505, as against £4,267,693 in the corresponding period of 1922, which figures average out to £1 4s. 2·6d. per ton for the past six months, as compared with £1 2s. 2·1d. for the corresponding period of 1922. Therefore, the value of the gas coal sent abroad in the past half-year averaged 2s. per ton more than in the June half of 1922.

A Railway Company and a Special Order.

WHEN Parliament confer powers upon a gas undertaking, they assume that the administrators will conduct the affairs with discretion, and comply with the obligations imposed upon them. There are very good reasons for the correctness of the assumption, in view of the capital involved, and the loss of business that is bound to result from indifferent management in these days of keen competition. Last week we referred to the depreciation of the value of Special Order procedure under section 10 of the Gas Regulation Act by the power that has been given to raise opposition to such Orders in Parliament, after they have been finally dealt with by the Board of Trade. The permissive prolongation of the procedure means an increase of expense to the promoters; and this is a matter to be deplored, especially in the case of smaller and less affluent undertakings. But there can be no general opposition to a Special Order; it can only be in respect of objections distinctly specified in a statement. This was pointed out during the proceedings, before a House of Commons Committee, on the Barnsley Gas Company's Special Order, as reported in our columns last week. Several Special Orders have been issued; but this is the first that has come before a Parliamentary Committee. Originally, there were two objectors to the Order—the Barnsley Corporation, and the London, Midland, and Scottish Railway Company. There was agreement with the former; and the points so agreed were endorsed by the Committee. Actual contention, therefore, was only raised by the Railway Company. The points on which they required amendment of the Order affected principles upon which the Gas Company were disinclined, and rightly, to come to a settlement. The Railway Company, however, succeeded before the Committee; but we doubt very much whether they would have done so had there not been agreed precedent for what they asked. It is a great pity that precedents on matters of principle, which impose fresh liabilities upon gas undertakings, should ever be agreed without being threshed out before the tribunal to which the Bill or Order is referred.

The Railway Companies have been very busy for some years endeavouring to forge in Parliament new obligations for gas undertakings. Calorific power, pressure, inerts, and other things have come within the ambit of their activities. Now in the present case the Railway Company have asked for, and obtained, provisos which Parliament have hitherto not considered necessary to attach to what are in these times quite general powers. The provisos are superfluous, seeing that gas undertakings do not conduct their businesses with a view to inflicting damage upon them. One of the developments of recent years has been the supply of gas in bulk to local authorities, companies, or persons beyond the limits of supply. There is economy in this, both for those who take the supply, and for the undertaking that manufactures the gas. Such expansion of the trading of established gas undertakings was contemplated in the report of the Fuel Research Board. But the power to supply in bulk to outside authorities, companies, or other persons is adversely affected by the proviso that the Railway Company have succeeded in imposing. It is true this proviso, in the same or other form, appears in three or four other Orders; but by agreement. It enacts that "the Company shall not "supply gas under any such contract beyond the limits of "supply if, and so long as, such supply would interfere "with the supply of gas within those limits." It is perfectly obvious that the existence of such a clause will create doubt in the minds of those who would purchase in bulk as to the wisdom of doing so; and yet no gas undertaking would dream of entering into any such contract without being well assured that they would be able permanently to comply with the demand without injuring the business within their statutory area.

Then, again, modern developments in gas consumption have necessitated a general clause which, in a progressive concern, would only be employed for temporary protection. Under the general law, a gas undertaking is, upon the request being made, compelled to supply gas to any premises under certain conditions; but the demand may be of such a character that they cannot do so immediately from the existing main. Therefore, a general clause is now usual, providing that the undertaking shall not be obliged to give from any main a supply of gas for any purpose, other than lighting or domestic use, in any case where the capacity of the main is, at the date when the supply is demanded, insufficient for such purpose, or if, and so long as, any such supply would, in the opinion of the company, interfere with the sufficiency of gas required to be supplied by means of that main for lighting or domestic purposes. To a clause of which the foregoing are, generally stated, the terms, the Railway Company have secured the addition of the proviso: "That this section shall not apply to any main used by the "Company for the supply by them of gas under a contract "entered into under section 25 of this Order." That is the section referring to the supply of gas in bulk to authorities, companies, or persons outside the limits of supply. This means that the Company, though they may lay a main sufficient only for the bulk supply, will now always be faced by the uncertainty of having claims made by other people for a supply of gas from that main. The railway companies are good customers of gas undertakings; but they are getting far too meddlesome in respect of the statutory conditions of gas supply. They might give the administrators of gas undertakings the credit for knowing how to manage

(without the intervention of outsiders) their own affairs to the best advantage to all concerned.

There is one other point. This refers to the fixing of new standard prices under the sliding-scale. This matter is dealt with in the agreement with the Barnsley Corporation. The Company is a maximum price one; but there is provision in the Order for the application at a later date of the sliding-scale. It is the view of the Board of Trade that conditions are not yet sufficiently stabilized to fix a new standard price which could have any considerable duration; and they therefore decided to allow a period of three years to pass before determining a standard price and applying a sliding-scale to the Company. Of course, the period before stabilization will have arrived is entirely a matter of speculation. The Corporation are of opinion that the period of three years is too long, and that from now to Oct. 1 next year will allow a satisfactory time for the settlement of conditions to take place. They are optimistic; but the Company agreed to the shortened term. Further, the latter consented to the obligation to make a reduction in price after Oct. 1 next year. The present price is 1s. per therm. Manifestly, both the Company and the Corporation regard as good the prospects of gas supply. In this, they are right.

Another Gas Light Reduction.

The Governor of the Gas Light and Coke Company (Mr. D. Milne Watson) took the opportunity, when meeting the representatives of municipal authorities and members of Parliament at Beckton on Tuesday of last week, to announce a reduction in the price of gas of 0·6d. per therm, making the charge 8·6d. per therm as from the June meter readings. This will represent to the consumers a saving of £400,000 a year. With the declared value at 500 B.Th.U., the price is equal to 3s. 7d. per 1000 c.ft. The highest charge by the Company since the war was 14d. per therm, or 5s. 6d. per 1000 c.ft., so that the reductions so far made amount to 5·4d. per therm, or 1s. 11d. per 1000 c.ft. The huge trading operations of the Company cause this reduction from the peak to equal an aggregate saving of no less than £2,500,000 per annum to the consumers. The price to-day equals less than a 50 p.ct. addition to the pre-war charge. When the Governor was addressing the municipal representatives, he made a sly dig at them, which caused some laughter. He promised that, if they would lower their assessments and rates, a further reduction should be made in the price of gas. However, the Company's price to-day is only 0·1d. per therm above the prices leading in lowness in the Metropolitan area—8½d. per therm for the South Metropolitan and Hornsey Companies.

Half-Year's Gas Coke Shipments.

Compared with May, there was a falling-off in June of gas coke exports; but an increase contrasted with June last year. The quantity last month was 59,997 tons; and in June, 1922, it was 34,175 tons—the respective values being £96,788 and £46,072. The average value per ton last month was £1 12s. 3·7d., or 7·1d. better than in May. The shipments of gas coke in the six months amounted to 506,768 tons, compared with 327,525 tons in the first half of 1922, and 217,603 tons in the corresponding period of 1921—the year of the coal strike. The values for the June half of each year were: 1923, £764,220; 1922, £488,528; and 1921, £562,383. The average price per ton in the past half-year was £1 10s. 1·9d.

Sulphate of Ammonia Shipments.

In June, 24,065 tons of sulphate of ammonia were exported, as compared with 11,563 tons in June, 1922. The total shipped during the six months ended June was 123,560 tons, as against 66,712 tons in the corresponding period of 1922.

The "N.P.K." Fertilizer.

In the "JOURNAL" for June 20, an article appeared, by Mr. E. Lloyd Pease, on the "N.P.K." fertilizer. He described its production and its virtues. An examination of the claims, method of production, the chemistry of the process, and the economic aspect is made by "Questor" in this issue [see pp. 366-7].

A Miserable Salary.

It seems to us that some gas managers are themselves to blame for the miserable salaries they are receiving. The Shoeburyness District Council have just appointed a Gas Manager at a salary of £160 per annum; and what is more, he is to serve "on probation" for three months. A salary of about £3 a week for a man with all the responsibilities of a gas undertaking upon him can only be described as disgraceful. We are glad to see that one of the members—Mr. Hillyer—at the Council meeting at which the appointment was confirmed, objected to the low salary, and later on he said, in reply to a question, "the trade union rate" for a gas manager "should not be less than £7 a week." That would be satisfactory for some very small works; but as gas undertakings ascend in magnitude, and the functions of the manager increase in responsibility, "the trade union rate" of £7 a week would be paltry and totally inadequate. Nevertheless, we are grateful to Mr. Hillyer for his protest. It seems that there were 77 applications for the position; and the candidates stated the salary they required. Five were selected—five, we should imagine, who assessed the value of their own services at the lowest point—and not one of the five asked for more than £5 a week! We cannot congratulate the District Council upon either good sense or their valuation of the reward which should be given for the efficient performance of the duties of a manager of their gas-works. A correspondent who calls our attention to this matter writes: "It is, of course, obvious that, if we are going to have people accepting appointments on such terms as those detailed in the report [of the Council meeting] then the gas industry is only going to deteriorate, and we shall not get the right class of men to train for the responsible positions." We agree.

"Mystery" of Gas Prices.

The gas industry has been enveloped by newspaper writers n a great deal of "mystery" during the past year or so. There was the "mystery" as to high gas accounts, the "mystery" of the therm, and "mysteries" as to other matters. Now the "Evening Standard" has found another "mystery" in the differences that exist in gas prices as between the gas undertakings in and around London. Some are diminishing their prices much faster than others, and have got to points which accentuate the higher charges per therm of other undertakings. If our daily contemporaries who find anything strange in these differences would only study the variations there are in the capital expenditure per unit of business done, in the costs of materials delivered on to the works through differences in location and quantity of purchases, together with the dissimilarity there is in local circumstances and capacity for business, they would find ample cause for widely different prices between gas undertakings.

Petrol and Benzole.

The price of petrol has been reduced by 3½d. per gallon; and that of benzole has been similarly lowered. The price of petrol was 1s. 7d. in 1914, so that it is now only 1½d. higher than then. During the intervening years there have been great fluctuations. The peak was reached in 1920, at 4s. 7½d. per gallon. Calculating that the consumption of imported petrol was 157,832,579 gallons in the first half of this year, the 3½d. reduction represents on a year's consumption at the same rate no less a saving than £4,603,450. The National Benzole Company have reduced their price for "National" benzole to 2s. 1d. per gallon, and for "National" benzole mixture (50 to 50 petrol and benzole) to 1s. 8½d. Motorists are very keen on this mixture. They know its virtues, including the additional power that it contains over petrol. Motorists are, of course, glad to see these reductions; but what of benzole producers and the prices of crude?

Revival of Old Ideas.

It has been shown in various articles in the "JOURNAL" that the proposals to effect catalytically the conversion of carbon monoxide to carbon dioxide, and to produce methane synthetically from either or both of the oxides of carbon, are not new processes, but that they have been the study of many workers. The same point is made by "A Gas Engineer" in an article in "The Times Trade and Engineering Supplement;" and he shows that there is nothing striking or novel about the proposals. It is well to have this widely known; but in view of the publicity that was given to the matter in the general Press, we should have been better pleased if somewhat similar statements could have been made through the channels which would have reached

the eye of the "man in the street." As the writer says, an impression appears to have got abroad that something had been discovered which was going to revolutionize gas production, and put into the distributing mains a gas which could be inhaled with the greatest impunity. Of course, nothing of the kind could happen; and no sensible man wants to see the process of gas making complicated, the vitality of gas impaired by the removal of a valuable constituent, and uneconomy imposed by way of unnecessary costs. However, since protests were made from the side of the industry, the carbon monoxide reduction process has receded from public gaze, and little is now heard of it.

Petroleum Bill.

The Select Committee of the House of Lords before whom the Petroleum Bill has been, are recommending that it should be thrown overboard, and that a new one should be constructed and introduced. Among the provisions recommended for inclusion in the new measure is that local authorities should be retained as licensing bodies, and that the conveyance of petroleum spirit by road and rail should be subject to regulation.

Atmospheric Nitrogen.

The Directors of the British Cyanides Company, Ltd.—particularly the Managing Director (Mr. Kenneth Chance)—are convinced that they have a very fine process for the fixation of nitrogen from the atmosphere, and that it is going to lead to important developments for the Company. It is what is known as the barium process. With it, important success has no doubt been achieved; otherwise Mr. Chance would not speak with such confidence, nor would the Board launch out on the expenditure they are contemplating in putting up plants for the purpose. It is asserted that the Company will now be able to obtain from the nitrogen of the atmosphere raw material in unlimited quantities for the cyanogen products which they manufacture. Therefore it is predicted that within a few months they will be supplying the world's markets with a part of their requirements of cyanogen products made from atmospheric nitrogen. Two plants are also in course of erection with a view to fixation at a sufficiently low cost to convert the nitrogen into ammonia, at a price which will enable competition with any other method of manufacturing the products. The last difficulties, too, have been overcome in respect of the manufacture of permanganate of potash by electrolysis; and new plant for this purpose is being erected. Altogether, the prospects are particularly bright for the Company—at any rate, the confidence is of that order; and it comes from a good quarter.

Fuel Oil.

The use of fuel oil appears to have grown at a very remarkable rate in America—more so than in this country. Its largest adoption here has been for marine purposes; not many railway locomotives have been constructed for its use; and it is known that many industrial boilers which were, during and subsequent to the coal strike, converted to fuel oil have reverted to the use of solid fuel. But in the United States, the consumption of fuel oil in 1922 reached the enormous figure of 10,600 million gallons—no doubt partly due to the coal strike there. This, however, is described as simply the stimulation of a tendency already conspicuously manifested. Prices, too, for fuel oil were relatively low; but this may be only a temporary phase. According to a statement issued by the United States Geological Survey, most things that are unfavourable with coal for steam-raising are favourable with fuel oil. Less loss of energy and better control according to load are among the features; and these conditions give greater uniformity to efficiency. Fewer stokers are required and the trouble with clinker is avoided. But experience in this country shows that this praise is subject to particular care in use; and so it does not picture things as they actually exist in practice. Atomization must be thorough, so that there is intimate mixture with the air necessary for combustion; and the quantity of air must be at the minimum to avoid unnecessary loss of heat in the stack gases. The mixture, too, must be burned in a furnace where a refractory material radiates heat to assist combustion; and the furnace must be equal to the temperature developed. A frequent source of trouble has been that combustion is not completed before gases have come into contact with the furnace walls. The flame has been extinguished; and there has sometimes been ignition in the flue connections or in the stack. An important point is that fuel oils vary considerably in heating value. Specific gravity is of great importance—fuel oils which contain the highest B.Th.U. per lb. give the lowest number per gallon. Three examples show this:

Sp. Gr.	Lbs. per Gal.	B.Th.U. per Gal.	B.Th.U. per Lb.
·9722 ..	8·10 ..	152,361 ..	18,810
·8974 ..	7·49 ..	144,482 ..	19,290
·8433 ..	7·03 ..	138,421 ..	19,690

For general purposes, it may be taken that a gallon of fuel oil yields about 144,000 B.Th.U.

GAS LIGHT AND COKE COMPANY'S FELLOWSHIP

AT THE IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY.

The Gas Light and Coke Company have agreed to provide the funds for a Post-Graduate Research Fellowship (to be known as the Gas Light and Coke Company's Fellowship), in connection with the Department of Chemical Technology at the Imperial College of Science and Technology.

The Fellowship has been founded for the purpose of encouraging experimental research in London in relation to gaseous fuels and combustion, or other subjects relating to the gas industry.

Mr. F. R. Weston, B.Sc., has been appointed the first holder of the Fellowship, and will take up his work on Oct. 1 next; the subject of research being the spectroscopic investigation of the flames of carbon monoxide and hydrogen, and matters cognate thereto.

PERSONAL.

The Blackpool Town Council have been recommended to confirm the appointment of Mr. DOUGLAS FORBES IRVING as Assistant Gas Engineer, at a salary of £450 a year. Mr. Irving has since the war been Shift Engineer at the East Greenwich works of the South Metropolitan Gas Company; and he has been selected out of 85 applicants. He was educated at Bristol University, and after serving his apprenticeship at the Bristol Gas-Works went to the Bournemouth Gas and Water Company, and acted as Superintendent on their Poole Works. Following a period with the Woodall-Duckham Company as Engineer, he became Assistant Engineer and Manager to the Torquay Gas Company; and after service with the Colours, he obtained his present position.

Mr. NORMAN H. THOMPSON, Assistant Engineer at the Port Glasgow Gas-Works, was last week appointed Assistant Gas Engineer and Manager to the Skipton Urban District Council. Mr. Thompson, who is the son of Mr. J. W. Thompson, Manager of the Barnoldswick Gas-Works, and therefore has personal associations with the Skipton area, is 26 years of age. He is an old boy of the Skipton Grammar School, and received part of his training at the Barnoldswick works. During the war he served in France, and was wounded. He held the rank of Lieutenant.

His many friends will be pleased to learn that Mr. B. A. LEWIS, the Manager and Secretary of the Carmarthen Gas Company, has been made a member of the new Society of Artists, Suffolk Street Galleries, London, where he has three works on exhibition.

At Oswaldtwistle Baptist Church, on July 19, the marriage took place of Mr. THOMAS HAWORTH, Assistant Manager of Oswaldtwistle Gas-Works, and Miss Ellen Huth. Among the presents was a handsome timepiece from the employees at the gas-works.

Alderman THOS. E. LOWE has intimated his intention to retire from the Burton-on-Trent Town Council, on medical grounds. He was elected unopposed to the Council in October, 1893, and was Chairman of the Gas and Electricity Committee from 1899 until a year ago, when two separate Committees were formed.

Mr. G. P. MITCHELL, the Blackburn Corporation Gas Engineer, was motoring in the town last Thursday, when his car came into collision with a motor van. Both vehicles were damaged, but fortunately there was no personal injury.

Mr. F. BARTON, one of the Labour representatives on the Congleton Town Council, has been appointed Chairman of the Gas Committee.

Mr. G. TREVOR SPRAGUE has been appointed Secretary to the Ferndale Gas Company, Ltd., in succession to his father, the late Mr. Joseph Sprague, who died last February.

Treatment of Dust by Surface Tension.—A fascinating exhibit at the recent Conversazione of the Institution of Civil Engineers was that of Sir George Scott-Moncrieff, who demonstrated the treatment of dust by the interfacial surface tension of liquids. If an emulsion is made of water, oil, and bitumen, the droplets of the emulsion maintain an energetic internal movement. By applying such an emulsion to dust, the particles are caused to coalesce and form comparatively large masses which cannot be classed with dust in that they quickly fall out of suspension in air. The emulsion has already been found effective in allaying dust on roads.

ELECTRICITY SUPPLY MEMORANDA.

THE Electrical Development Association are actively engaged in the endeavour to persuade the electricity supply undertakings that a co-operative display at the British Empire Exhibition next year should be undertaken to demonstrate the abilities of electricity in raising the standard of comfort and efficiency in the home, the factory, and the street. It is stated that the engineers of both municipal and company undertakings are supporting the scheme. This is quite natural; but what the Association obviously recognize as more important is that they should know that those who hold the purse-strings—the committeemen and directors—are willing to give material support. The character of the display, its extent, and its power depend entirely upon the degree of the financial support. Displays for such a period as this exhibition will be running cannot be made without pretty full coffers. The Association are pressing the matter. "Already," it is said, in the short space of time since the launching of the appeal, twenty-three supply undertakings have pledged their support; and definite promises of recommendation have been made by a number of other authorities and companies. But it is urged that this is not enough. If the scheme is to be made really effective and successful, the whole weight of the supply industry must be put into the venture without delay. "Time is of the utmost importance." It is unnecessary to comment on this; but it is quite evident the Association would have been better pleased to see an avalanche of financial support immediately the proposal was put forward. But this is not how things are done in industries. The constituent undertakings refuse to be rushed; and "time is of the utmost importance" for maturing enthusiasm and the flow of subscriptions.

Boosting Work for Wembley.

It is a long time since the "JOURNAL" first wrote on the subject of the potential value that share or stock holders in any company should be to the concern. Most of them simply regard themselves as investors, and consider that their sole interest is confined to financial results and dividends. Those ideas, we are afraid, are very largely fostered by the administrators, who are, after all is said and done, simply the persons elected by the share or stock holders to direct the business. One of the functions of directors is to do all possible to develop business, whatever its nature; but it is rare that one finds any special efforts made to inspire the share or stock holders to become active agents for the concern by taking advantage of their opportunities. To do this is a matter of education; and in this direction the access that directors of a company have to the shareholders should enable some very effective work to be done. We see that the General Electric Company have issued a booklet to their shareholders. One of the prefatory notes says: "The Directors of the Company hope that it will not only prove interesting as indicating the manufacturing ramifications of the G.E.C., but that it will also serve to enlist the support of those interested in the Company's welfare, whose help by purchasing G.E.C. products for their own use, or by recommendations to their friends, will be of ultimate benefit to all concerned." In other words, the Directors of the Company are seeking to induce the shareholders to get beyond the mere question of dividend, and help to ensure and improve it by taking a live interest in that part of the work which produces the revenue, and therefore the dividends. They want to be educated to the view that they are not only investors, but actual partners—not merely sleeping partners—in the concern. The share and stock holders in gas undertakings are ubiquitous; their influence must be enormous, and so must be their friendships. Their value to the business of the gas industry should be immense. Efforts should be specially made to extend among them the uses of gas, and to see as far as is possible that they get the utmost efficiency out of their appliances. If this is done, they will talk of good experience among their friends. We know this is so. On occasion, when neighbours have complained of poor effects from (say) gas-fires, we have shown them fires supplied with gas from the same main that were giving gratifying results. What one man can secure from gas can be obtained by other consumers in the same street or district—if they are only shown the way. That is important; and one satisfied consumer can often demonstrate to a dissatisfied one how it can be done. A shareholder should be shown how—either in this way, or by recommending gas appliances—he can assist the undertaking in which he has invested his capital or part of it. To get shareholders to take a live interest in the actual development of the affairs of the concern is an excellent plan. Personal recommendation is something worth cultivating.

The Value of the Shareholder.

It is a new feature in electrical affairs to find electrical contractors giving warning against dangerous practices. They have lately shown an ambition to raise the general standard of electrical installation work by doing what they can—and it is very little—to keep incompetent men off the list of contractors, because they realize that these incompetents are doing untold mischief through their slipshod work and shoddy material. Now they have adopted the rôle of advisers. The Electrical Contractors' Association have passed a resolution in which they record their opinion that it is a dangerous practice to instal the two sides of a three-wire direct-current system in one room in a private house or office where portable apparatus is used, and that, for the protection of the public, the practice should be discontinued. The Association also say that they are anxious to do all that is possible to develop the use of electricity for domestic purposes, and to make it safe for the public. Therefore, they submit for consideration that the balancing of one house or flat against another will give a far more effective balance than the manner now adopted by some supply authorities. It is usually the latter who criticize the contractors; it is something new to have the latter taking the part of critics of the supply undertakings. They would not do this without very good cause. The fact that they are doing it indicates the prevalence of a practice which is dangerous. The "Electrician," being in favour of safety in the house, is in full agreement with the first proposition. It adds that "far the greater proportion of the portable electrical apparatus now in use is of such a capacity that it can safely be connected between the outer and the neutral. Almost the only exception is the large fire, which is certainly portable, but it is not often carried about; and, even when it is used, balancing by houses or flats would give the desired result, and be much safer." Our contemporary congratulates the contractors on calling attention to this matter.

The Contractors and Safety.

The question of explosions caused by the propensity of bitumen covered cables for generating gas was raised at the recent meeting of the Institution of Gas Engineers; and some interesting experiences were then recounted. Shortly afterwards, we came across a paragraph in an evening paper, which stated that "three fire-engines and eighteen men were called out to an explosion in an electric distribution box in Gloucester Road, South Kensington, during the night." About the same time, we opened an electrical paper, and read a report of a case, which the Postmaster General had carried to the House of Lords, appealing against a decision of the Court of Appeal. It was an action against the Corporation of Liverpool to recover £40 8s. 7d. damages—the agreed expense of repairing telephone cables, pipes, and a manhole which were damaged by current that had wandered from the Corporation electric mains. The Law Lords were not sparing in the use of condemnatory expressions of opinion as to the action of the Postmaster General in wasting public time and money in futile law cases. An exposition of the legal position was subsequently made in a short article, in the "Electrical Times," by Mr. F. Charles Raphael. From what he says, it is seen that it was actually contended in the case that, for any damage occasioned, an electricity undertaking should be liable, even though the damage complained of was contributed to by the negligence of the Post-Office Department, through want of reasonable care or skill in selecting the position of their own cable. The telephone cable concerned in the case, it appears, was laid by the National Telephone Company (whose liability the Post-Office had taken over) directly under, and practically in contact with, the electric light cable. Lord Birkenhead made it perfectly clear that section 8 of the Telegraph Act, 1878, would not apply when the injury to the Postmaster's property was due to negligence on the part of the Post-Office. Referring to other owners of underground property, Mr. Raphael says: "While the Postmaster has merely to prove injury, without negligence on his part, in order to recover damage, the position of the owners of other underground pipes—such as gas and water—is not so strong if their pipes are injured by current leaking from the mains of an electrical undertaking possessing statutory powers. They have, however, a clear claim if they can prove negligence, technical or otherwise, on the part of the electricity or tramway undertaking; and it is to be feared that this is frequently overlooked by supply station and tramway engineers."

Damage to Underground Property.

Energetic enterprise is being shown by Mr. L. L. Robinson, the Electrical Engineer of Hackney, in developing electric cooking. He held an exhibition last year; and up to the present he has 200 electric-cookers connected to the mains. In the "Electrical Times," it is acknowledged that this may seem numerically small; but it is said to be but the prelude to "much bigger things." Interest has been fostered in other ways. At the present time, a series of cooking demonstrations is being carried out at the electrical showrooms; and there is a wrinkle here. Meat and foodstuffs, supplied by local caterers, are being cooked daily in the showrooms in full view of passers-by. To get from caterers a supply of food for the purpose is an economy upon which we can congratulate Mr. Robinson. The saving of "waste" by cooking electrically is being made the predominant feature of these demonstrations, which, it is said, are constantly attracting a "fair-sized" crowd. The weights of the joints before and after cooking are chalked upon a blackboard; and the percentage loss is indicated. One statement is that a joint of beef, which before cooking weighed 3 lbs. 12 oz., went through the ordeal with a loss of only 2 oz., or 3·3 p.ct. This is a remarkable showing; but, as we read on, it is observed that the weight of the cooked joint includes dripping. We should like to know the temperatures employed in the oven; and their respective durations during the cooking period. Then the result is

Demonstrations and Meat Waste.

given for cooking a joint of lamb. The weight of the raw joint was 2 lbs. 12 oz.; the weight cooked, 2 lbs. 8 oz.—a loss of 4 oz., or 9 p.ct. Then it is stated that a joint of lamb, weighing in the raw state 4 lbs. 2 oz., lost, when cooked "by other means," 12 oz. in the operation. Why was a much heavier joint of lamb cooked "by other means" than by electricity? Again we ask what were the respective temperatures and times spent in the cooking? The sales manager of the Electricity Department says that everything possible was done to make the tests truly comparable. We know that there have been other tests made that have been truly comparable in respect of weights, temperatures, &c., and in which the results have been different from the Hackney ones. It is also stated that the 9 p.ct. loss the electric way is an average figure; while the 18 p.ct. loss "by other means" is distinctly flattering. What is the supposed mysterious influence in heat generated electrically that produces results different from heat generated some other way? It would be interesting to cooking experts to have more data. Such bare figures as are given in the report on the Hackney demonstrations do not enable any complete examination to be made, nor could similar joints be subjected to tests, without information as to the conditions employed, to allow a check to be made of the Hackney figures.

The Importance of Fuel Technology.

In the preceding paragraph, reference is made to Mr. L. L. Robinson. A pithy article from his pen, on "Fuel Economy in Small Stations," has appeared in the "Electrician;" and we should like to endorse every point he makes. As he remarks, with modern boiler plant and turbines, worked at fairly high steam pressures, and with a reasonable provision of condensing water, the small power station can approach much more closely to the thermal efficiency of a capital station than was considered possible only a few years ago. He holds that very many small stations are not giving the economic results they should do—say, 10 to 15 p.ct. of the B.Th.U. in the coal received as units of electricity. He attributes this more to the way the plant is handled than to the plant itself; and there is a great deal of truth in this, judging from fuel experiences in other industries. In his opinion, this is due to the fact that power station assistants have in the past been selected for their qualifications as electrical men rather than fuel economists, with a sound knowledge of inorganic, and a reasonable knowledge of organic, chemistry. Engineers-in-charge have usually reached the position *vid* the switch room; and they lack the knowledge which is necessary for scientific economic working. In the larger power houses to-day, there is at least one chemist or fuel economist, with the result that there has been an improvement in thermal efficiency. His view is that it is to the fuel economist or chemist that all power stations must look for improvements. In such circumstances, when a man reaches the switchboard attendant's job, he will stay at that point; it will not serve as a means of access to the higher positions unless he shows very extraordinary ability, and has had a thorough training in fuel technology.

Public Works, Roads, and Transport Congress and Exhibition.

His Majesty the King has graciously consented to grant his patronage to the Public Works, Roads, and Transport Congress and Exhibition, which is to be held from Nov. 22 to 29 next at the Royal Agricultural Hall, London, N. The arrangements for this important event are in the hands of the Congress Organizing Committee, of which Sir Henry P. Maybury, K.C.M.G., C.B., Director-General of Roads, is Chairman, and which is comprised of representatives of the Ministry of Health (ex-officio) and all the principal associations of local authorities, public bodies, and their officials; the object being to provide an opportunity for the discussion of the many problems which confront those who are responsible for the administration of the public services. The vast increase in the number of fast, mechanically-propelled vehicles now in use renders it imperative that roads and bridges should be constructed in such a manner as to cope efficiently with present-day requirements. The expansion of industrial and residential areas throughout the country necessitates the periodical discussion of such public services as sewage disposal, water supply, refuse disposal, housing, and public lighting. The Congress will be attended by officially appointed representatives from local authorities and other public bodies throughout Great Britain; while the attendance of a considerable number of representatives of the Self-Governing Dominions is anticipated. Practically the whole of the available exhibition space in the Royal Agricultural Hall has already been booked by firms specializing in materials, machinery, plant, and vehicles used in connection with public works and municipal undertakings. From the point of view of the general public, the exhibition will present a most interesting display, and will give the "man in the street" some idea of the many duties which his own local authority have to perform.

The late Mr. Sidney Ward Tamplin, of Southport, Managing-Director of Messrs. Donald Macpherson & Co., Ltd., left estate of the gross value of £13,871, with net personalty £11,606.

MUNICIPAL REPRESENTATIVES AT BECKTON.

Further Reduction in the Price of Gas Announced.

There was a keenly interested gathering at Beckton on Tuesday of last week of representatives of the municipal authorities of the districts served by the Gas Light and Coke Company, who had assembled on the invitation of the Governor, Deputy-Governor, and Directors, for the purpose of seeing as much as is practicable in the course of a morning's tour of the gigantic gas-making and other operations carried on at these works. The tour had been excellently mapped-out with this object in view; and comments made showed that the visitors were deeply impressed by what they saw. Some 150 invitations had been sent out; and there must have been about this number in the half-dozen parties who took part in the inspection, which started from the statue of the late Sir Corbet Woodall. Here the visitors were able to see for themselves the complete lack of truth in the oft-repeated assertion that vegetation and gas-works will not flourish side by side.

The exhauster room, turbine room, and generator house connected with the carburetted water-gas plant were first visited, and then the new "Rapid" water filtration plant, by United Water Softeners, Ltd., recently erected in a concrete house near the loading and unloading piers, for the purpose of replacing the Company's old system of dealing with a part of their water supply. The plant is capable of clarifying per day 4 million gallons of Thames water, which is employed for coke quenching, gasholder tank filling, and many other purposes about the works. Locomotives next conveyed the parties to the magnificent new workshop, which it is safe to say was entered with a feeling of amazement and left with an equally strong feeling of regret on the part of all who had not had the privilege previously of seeing this "hive of industry." The regret was on account of the fact that it was not possible to spend more time watching the work of the wonderful machine tools, &c., installed there; and the amazement was to find what is practically "a works within a works." This building, which is in concrete, and was erected in 1921, is, indeed, the largest repairing shop in the London district, and it certainly must be one of the most completely equipped. Great attention has been given to providing a shop in which everyone employed shall enjoy the maximum possible amount of light and fresh air. The shop is divided into four bays—No. 1 devoted to light work and pattern making, No. 2 for heavy work, No. 3 for crane and locomotive repairs, and No. 4 for truck repairs and blacksmiths. In addition to the work carried on in these shops, the Company have in another portion of the works a foundry and carpenters' and wagon-building shops, and are therefore in a position to deal efficiently with any breakdown of plant immediately it occurs.

Three out of the large number of retort-houses were visited—No. 8, which is capable of producing 4½ million c.ft. of gas per day; No. 10, which used to turn out 2½ million c.ft. per day, but before it can be again put into operation will require to be reconstructed on similar lines to No. 8 house—thus about doubling the capacity; and No. 12, the largest house at Beckton, which is capable of making 7 million c.ft. of gas per day. The last-mentioned house proved to be particularly interesting, inasmuch as the retorts were under renewal. A short time was spent in the tar and ammonia works, and then a run to the piers and along the railway viaduct gave the visitors a bird's eye view of the general arrangement of the Beckton works, the annual output of gas by which is 17½ thousand million c.ft.—equal to 87½ million therms. The total gas made by the Company in 1922 was almost 36 thousand million c.ft., or nearly 180 million therms; and this is distributed to the 900,000 consumers through 2755 miles of mains. The Company use nearly 2 million tons of coal per annum, employ about 15,000 men, and pay £2,750,000 in wages and salaries.

At a luncheon which followed the inspection, the chair was occupied by Mr. D. Milne Watson (the Governor), who, in extending a cordial welcome to the guests, said they were delighted to have with them at Beckton that day representatives of the City of London, the London County Council, other municipalities, and some friends among the Members of Parliament. They had very often entertained gatherings at Beckton—distinguished bodies of scientific men, and representative bodies from foreign countries—but he believed this was the first occasion on which they had been thus visited by a party representing the municipal life of London in all its phases. The Board felt it was high time that some of the gentlemen connected with London's municipal life should see the works which supplied them with gas—especially as many of these bodies were themselves purveyors of electricity, and from time to time some quite uncomplimentary things were said about the older competitor gas. He noticed that it had recently become fashionable among certain municipal authorities to say that gas was out of date, and, in fact, that it was almost dead. Well, this was an additional reason why the Company were anxious that the authorities should see exactly what they were doing. He himself had read not very long ago a motion submitted to a very well-known body which set forth that gas was no longer necessary for the running of a house, in respect of lighting, heating, or cooking. Now, this might be from one point of view a highly interesting proposition; but he thought they would agree with him, from the evidence they had seen that day, that gas was quite alive. It was generally admitted that electricity had its great uses—they even employed it at

Beckton—and if the electricity enthusiasts would admit that gas also had its uses, he would be content to leave it at that. There was a field for both—each was absolutely necessary to the life of the nation. There was, however, one thing that electricity could not do; it could not produce valuable bye-products. On the other hand, he ventured to say that if, by a stroke of legislation, either municipal or company gas undertakings were done away with, the nation would immediately have to set about establishing gas-works itself. Some of those present would doubtless recall the vital service done by the gas industry during the great war ["Hear, hear"], and so would realize that, if the gas-works as they existed at present were put out of action, it could not be long before they were started again for the purpose of national defence. And not only was the gas industry necessary for war, but it was necessary for peace also, as a brief enumeration of the products revealed. Referring to his own undertaking in particular, Mr. Milne Watson proceeded to quote some impressive statistics. Most of the workmen, he said, were co-partners; and he was proud of the fact that these co-partners (whose representatives were present that day) owned no less than half-a-million of the Company's ordinary stock. The Directors firmly believed that a contented workman was a good thing for the Company, and a good thing for the country ["Hear, hear"]; and they did their best to make their employees happy.

But, the Governor went on, probably the most important thing to the visitors was the price of gas; and however disagreeable it might be to those of them who sold electricity, the Board also realized that it was most important from the point of view of the community that gas should be as cheap as possible. In this connection, he had a very pleasing announcement to make to them—namely, that the Directors had decided to reduce the price of gas from 9·2d. per therm to 8·6d. per therm—or in other words, going back to the old terms, from 3s. 10d. per 1000 c.ft. to 3s. 7d. per 1000 c.ft. This drop, which took place as from the reading of the meters in June, meant something like £400,000 a year saving to the 900,000 families consuming gas in their area at the present time. The highest price the Company had charged since the war was 14d. per therm, or 5s. 6d. per 1000 c.ft. Thus the reductions made amounted to no less a figure than 1s. 11d. per 1000 c.ft., or a saving of round about £2,500,000 to the consumers in their district. Therefore they would realize that the Board had done their best to reduce the cost of living. The price of gas before the war was 2s. 6d. per 1000 c.ft., and it would now be 3s. 7d., which was approximately 50 p.ct. increase on pre-war. He hoped they would all agree that this was a satisfactory state of affairs ["Hear, hear"], inasmuch as the Company were paying for their coal nearly 100 p.ct. more. Really, he felt he could not allow this opportunity to pass without pointing out that, if the local authorities wanted the price of gas to be still lower, they must look to their assessments and their rates. [Laughter.] If these were lowered, he could promise them a further reduction in the price of gas.

The thanks of the visitors were voiced by the Mayor of Kensington, who remarked that there were many things for which they should all be very grateful to the Company. It had been of considerable interest to see the marvellous organization of these great works.

Converting Coal House-Heating Furnaces to Gas.

The Fuels Utilization Corporation of New York are offering to the gas industry the "Harder" conversion system, which is said to permit of the effective modification of the usual cast-iron boiler or hot-air furnace so as to allow of the economical use of gas. This conversion equipment has been proved in measured operative tests to have an ordinary service efficiency of 65 p.ct. As described by Mr. J. F. Meader in the "Gas Age-Record," the arrangement comprises the "Harder" preheater and waste-flue heat economizer, "Harder" duplex gas-burner, "Harder" refractory fuel-bed and burner-head, any standard thermostat or automatic temperature regulator and fuel control, a quick-acting spring or electro-magnetic gas-valve, and a pressure governor. The preheater consists of a sheet-iron chamber containing approximately 150 tubes, through which the air supply entering the combustion chamber is drawn. The hot flue gases leaving the outlet of the boiler furnace enter the preheater, and pass round the cross tubes, thus giving to the air within the tubes the high temperature which, without the preheater, would enter the chimney as an absolute fuel loss. Afterwards the air passes through a sheet-metal duct to the ash-pit entrance of the boiler furnace; and, on reaching the combustion chamber, it receives a further preheating, thus raising the temperature to a point nearly equivalent to that of ignition before the air is utilized in the combustion of the gas at the burner head. The second feature is the special duplex burner—a burner within a larger burner, providing for a maximum or minimum gas consumption, as the varying room temperature may demand. The head of the burner is constructed of refractory material which becomes incandescent as a result of the primary combustion of the gas. The third feature is the refractory grate and fire-bed, located above, and supported by, the refractory burner-head. After primary combustion has taken place, the gases pass upwards through the refractory grate and the refractory briquettes of which the fire bed is constructed, resulting in the latter being raised to a highly radiant state.

THE INSTITUTION OF GAS ENGINEERS, THE LEEDS UNIVERSITY, AND THE WRITER.

By J. H. BREARLEY, M.Inst.C.E.

PRESSURE of work has prevented my turning earlier to the discussion which arose at Belfast on the annual report of the Council of the Institution of Gas Engineers. There are opinions expressed, and statements made, in that discussion which do not fairly represent the facts; and as, on the one hand, I have been asked by many friends to give my views on the closing of my connection with the links between the Institution and the University of Leeds, and, on the other hand, the members of the Institution are still without an accurate account of that incident, I am obliged, with reluctance, to recite what follows. It is no pleasure to me to bring the Leeds University into a controversy which those who represent it have done nothing to cause, and which I am sure they deplore. I have consistently been among those who looked upon the union between the Institution and the University for the purpose of technological progress as one fraught with inestimable value to the gas industry. It is therefore necessary to emphasize that, for what it is worth, my earnest desire is that the work of the union shall proceed unimpaired. Once the Institution Council actions in regard to myself are accurately set out, men of high purpose will not readily endorse them. If attempts had not been made at Belfast (1) to confuse the point at issue, and (2) to represent me as an individual who "had been treated very fairly indeed," and, by inference, an undesirable "grouser," I should have been prepared, in its personal aspect, to let the matter pass. But I cannot permit silently either Presidents or ex-Presidents to put the tarnish on my character which they have already applied to the work of the Institution.

HOW THE FIRST LINKS WERE FORGED.

Before proceeding further in the distasteful part of this narrative, it is fitting that I should review as briefly as possible a little of the earlier history of the association of the University with the Institution. In doing this, I hope I shall be exonerated from the suggestion of a desire to magnify my own part or the value of any work which I have done, either before or since the association became an accomplished fact. It will be remembered that in 1907 I read a paper on "The Testing and Hygienic Efficiency of Gas-Fires." (Of that paper the Council of the Institution at the time were appreciative enough to award me the "London" Gold Medal.) In 1906, I was pressed to present this paper by Mr. Irving, then President, who had ascertained that I was engaged upon this research; but I had not carried the work far enough to form the basis of a paper that would have satisfied me. I was, however, ready with it in 1907, when Mr. Charles Hunt was President.

I may say here, for the first time publicly, that in the task which I had set myself I found it necessary to seek guidance upon certain aspects of the work; and Prof. Smithells (whose greatness and graciousness the gas industry cannot appraise too highly) freely gave me interviews and the benefit of his wise counsel. Already Prof. Smithells had proved a generous encourager of the Yorkshire Junior Gas Association, in the formation of which I had a prompting share, and which the Association recognized many years ago by electing me an Honorary Member.

During the Institution Council proceedings between 1906 and 1907, the question of research was debated. The Council had some funds, and were seeking a way of expending them judiciously. Mr. Charles Hunt was then President; and I would here say that a good deal of credit attaches to him for the pre-eminently practical way in which he saw the possibilities attaching to closer association with the Leeds University. I advocated gas-fires as a fit subject for research, knowing from my own contemporary work what a vast amount remained to be done. Mr. Hunt and I went as a deputation from the Council to Leeds, and had an interview with Prof. Smithells and other authorities of the University. At that interview the seeds of associated research were sown; the first fruits being the establishment of the Institution Fellowship at Leeds University. In the latter, the honours may be fairly divided between Mr. Charles Hunt and Prof. Smithells. Later, the Livesey Memorial came into being; and the form which it should take was the subject of private conversations in which I had a part, but which wild horses will not drag from their archives. Enough to say that to Prof. Smithells belongs the honour of suggesting that it should take the form of a Professorship, and to the gas industry, ably led by (then) Mr. Charles Carpenter, Mr. Corbet Woodall, and Mr. Thomas Newbigging, the credit of backing his wise judgment.

EXTRACTS FROM THE COUNCIL REPORTS.

I now turn to the more formal reports of the Institution Council as they have appeared from 1907 onwards, and make certain chronological extracts.

> 1907.—A Sub-Committee formed to investigate the economical application of gas for heating purposes, consisting of Messrs. John Bond, J. H. Brearley, and Chas. Wood. "With the latter Committee it is hoped to secure the co-operation of Profs. Smithells, Bone, and Cohen, of the Leeds University. With reference to the investigation into the economical application of gas for heating purposes, in order

that adequate facilities could be obtained for carrying out the special experiments, tests, &c., required in a satisfactory manner, the Council, after consultation with Prof. Smithells, offered to establish at the University of Leeds an Institution Fellowship . . . " (I acted as Convener of this Committee until the duties were taken over, later, by the Livesey Professor.)

1908.—Dr. Drugman appointed Research Chemist. Mr. Arthur Forshaw, M.Sc., elected Fellow.

1910.—Livesey Memorial Professorship Committee about to be established, to consist of representatives of the University, the Institution, and the Society of British Gas Industries.

Sub-Committee on Gas Heating as at formation; Mr. E. W. Smith acting as Research Chemist.

1911.—Mr. E. W. Smith (now Dr. Smith) removes to Birmingham. It was then felt that the Sub-Committee on Gas Heating should not ask for re-appointment; and for the time being its separate existence was relinquished.

1914.—The Joint Committee on Ventilation Research proposed by the Council in 1913 had been constituted as follows: Messrs. J. Bond, J. H. Brearley, E. W. Smith, and C. Wood representing the Institution.

1915, 1916, 1917.—Joint Committee on Ventilation, &c., remains as before.

1918.—Gas Investigation Committee first comes into evidence, and consists of Presidents, Vice-Presidents, Hon. Secretary (ex-officio), and Messrs. Bond, Brearley, Broadberry, Carpenter, Chaney, Cobb, Cohen, Drury, Evans, Gibb, T. Glover, Goulden, T. Hardie, Shadbolt, Shoubridge, E. W. Smith, Smithells, Thompson, A. Wilson, C. Wood, H. Woodall, Woodward, and Young.

The Gas Heating, Lighting, and Ventilation Committee —*i.e.*, Messrs. Bond, Brearley, Smith, and Wood—were made the Research Sub-Committee for the purpose of investigating the relative efficiency in use of different grades and compositions of gas, and reporting thereon to the Gas Investigation Committee.

1919.—Mr. Lawrence Hislop, of Uddingston, co-opted a member of the Gas Heating, Lighting, and Ventilation Committee. Otherwise, constitution unchanged.

1919-20.—Constitution of the Committee unchanged.

1920-21.—Dr. E. W. Smith resigns; and Mr. T. Glover takes his place. Mr. H. E. Bloor added as an Institution representative. Mr. T. F. E. Rhead co-opted.

1921-22.—No change in constitution of Committee. At the end of this volume of "Transactions" the members of the various Committees are given. The names appearing under the Gas Heating, Lighting, and Ventilation Committee as Institution representatives are: Messrs. H. E. Bloor, J. Bond, T. Glover, and *S. Tagg*.

The names of the Livesey Advisory Committee are: Messrs. Bond, Carpenter, Gibb, Samuel Glover, T. Glover, T. Goulden, T. Hardie, J. D. Smith, *S. Tagg*, and C. Wood, representing the Institution.

The name italicized here is the only alteration on these two Committees, and takes the place occupied by the writer's. It is the only instance in the whole record from 1907 where a man has been *compulsorily retired* to make way for another.

A Resignation, its Withdrawal, and the Anti-Climax.

Now we come to the personal aspect. In 1919, on the transfer of the Longwood undertaking to the Huddersfield Corporation, I removed to Southport, where I have since been engaged in consulting practice. It occurred to me in May, 1920, that possibly, consequent on this change of geographical situation, the Council of the Institution might desire to make a change in the Research Sub-Committee, upon which I had acted throughout (*vide* above extracts) as a member. I accordingly sent in my resignation, so as to leave the Council free from any feeling of reluctance there might be on account of my long connection with this link with the University. I received the following letter, dated June 5.

> At the meeting of the Council held on the 3rd inst., it was unanimously resolved that you be asked to retain your membership of the above Sub-Committee. Will you please let me know that you are willing to do so?
>
> W. T. DUNN.

To this letter was a postscript informing me that Mr. T. Glover had been nominated to serve on the Sub-Committee; it having been decided that two extra members be added—one representing the Institution and one the University of Leeds. I replied:

> In view of the unanimous wish of the Council, I will retain membership of the Committee. I am glad that Mr. T. Glover has been nominated as an additional representative.

On June 28, 1922, I received the following letter from Prof. Cobb—

> I am informed by letter from Mr. Dunn that his Council has appointed Mr. Tagg, of Preston, on the Gas Heating, Lighting, and Ventilating Research Committee in your place. It came as a surprise to me. I assume it to mean that you made a final decision to resign, and sent in your resignation to Mr. Dunn. I need hardly tell you how much your resignation and absence from its meetings will be felt by the whole Committee, including myself; and I hope that you will send me a letter which I can read at our next meeting.
>
> JOHN W. COBB.

This was the first intimation that I had received that I was no longer a member of this Committee. My reply is too long for reproduction; but it expressed my amazement, stated that I had had no intimation from Mr. Dunn thereon, and the feeling that there was a huge misunderstanding somewhere. It may be here remarked that subsequent correspondence, and the attitude of the late President (Mr. J. D. Smith) and of the present President (Mr. Samuel Tagg) at Belfast, show that the removal of my name was deliberate, and therefore must be judged on its merits.

On June 29—the day following the one on which the letter arrived from Prof. Cobb—I received a most kindly personal letter from Prof. Smithells, in which he also expressed regret that I was to be no longer a member of the Research Committee.

On July 4, 1922, I wrote Mr. Dunn as follows—

> RESEARCH SUB-COMMITTEE.
>
> Greatly to my astonishment, I have received a letter from Prof. Cobb stating that my name has been removed from the above Committee. Neither he nor Prof. Smithells can throw any light upon it. I shall be glad to have your explanation, as it seems there must be a mistake or misunderstanding somewhere.

Under date July 5, 1922, I received from Mr. Dunn the following letter in answer:

> Replying to your letter of the 4th inst., the Council for 1922-23, in appointing the Committees and Sub-Committees for the new year, made various departures from the previous lists, with the object of widening the interest in the work which is being carried out.
>
> Needless to say, they greatly appreciate the valuable work which you have done during the time you have been a member of the Sub-Committee.

To this letter I replied pointing out that only two years previously I had withdrawn my resignation from the Committee on the unanimously expressed wish of the Council. Further, that I could not see the interest was widened by my removal, and asking for information as to the present constitution of the Committee. This revealed the fact that *the only alteration was the substitution of the name of Mr. Samuel Tagg for my own.* In this letter, I also said:

> I know that the various Committees are formed somewhat hastily in the rush of matters at the closing stages of the Institution meeting—this from eight years' service thereon. Otherwise, I am quite sure they would have more than hesitated before following a course of action which, *taken in conjunction with what took place two years ago*, is not justified by the explanation you have given me.

Further correspondence disillusioned me as to the possibility of the mentality of a Council changing so drastically that within the short space of two years it could find it within its interpretation of fair dealing to invite a man to continue on a Committee and then silently drop him. Upon the last-named aspect, the explanation given to me on behalf of the Council was: "It is not customary for notice to be given by us, and hence what erroneously appears to be an omission." Regret was expressed that the action taken in substituting another member of Committee should have caused me any inconvenience or regret which "was quite unintentional." Appreciation was expressed of my "valuable work," and regret that "through force of circumstance this has come to a conclusion." The force of circumstance was explained by the statement that the total membership of the Sub-Committee is restricted to five, which necessitated the replacement of an existing member, and that this was done without any thought of differentiation. Incidentally it may be observed that the number has exceeded five by co-option.

Flowers have been freely sprinkled on the tomb of the departed member; but unfortunately the spirit of the departed remains to bear witness to this unparalleled way of shutting-down the enthusiasm of a member of the Institution whose record of service in this connection, fortunately, cannot be subdued.

The Livesey Professorship Advisory Committee.

But the foregoing does not reach the end of the story of this Council of unique mentality. I am obliged to use the conglomerate term "Council," because the whole of the Council bear the responsibility, though the active participants are probably few, but, for the time being, highly placed.

Under date April 18, 1923, I wrote the following letter to Mr. Dunn, the contents of which are self-explanatory—

> I notice in the "Gas World" of Saturday last that on March 6 there was a meeting of the Livesey Advisory Committee at Leeds University, and that the laboratories were inspected, &c.
>
> I was under the impression that I was a member of this Committee. Anyway, I have had no notification otherwise. Yet I did not receive notice of this meeting; and I shall be glad if you can explain the circumstances under which I was omitted.
>
> JNO. HY. BREARLEY.

The reply came as follows:

> In reply to your favour of the 18th inst., I have to point out that the period of appointment of the various Committees and representatives of the Institution is one year.
>
> The list is always revised after the annual meeting of the Institution; and the complete list for the year 1922-23 will be found at p. 458 of the volume of "Transactions" for 1921-22, a copy of which has been sent to you.
>
> W. T. DUNN.

It should be explained here that, though I was not an original member of the Livesey Advisory Committee, I was elected to that Committee upon the first vacancy—I believe it was by the

resignation of Mr. Shoubridge, at least ten years ago—and continued as a member until June, 1922. Then I was removed from both the Research Committee and the Livesey Advisory Committee; and in each case the name of Mr. Samuel Tagg was substituted. It will be noted that in neither case was I informed that my name had been removed, and that I was left to find out as best I might how the Council had acted.

With regard to the statement that the appointments are only for one year, it must be said that on neither Committee from their inception, to the best of my knowledge, has a name previously been removed, save by death or resignation, or a pre-determined temporary co-option. There is a code of honour that comes before "rules," which have deliberately and wisely been allowed to fall into obsolescence whenever good service has been rendered. Those who have propounded this novel explanation of the two changes here recounted may deceive themselves that it was "the only way;" but I do not think that many members of the Institution will join them in the delusion.

The Belfast Discussion.

We now come to the Belfast discussion. As I was unable to be present, I have only the report in the Technical Press to go upon; but it is enough to have provoked the foregoing extended account of these "incidents." Here I would express thanks to Mr. W. B. M'Lusky for his experiment in ventilation—the results of which, however, only emphasize the pitifulness of the whole business. I am bound to note it or stand in a focus towards which I have no inclination.

Mr. Samuel Tagg said: "It is necessary, as members leave the Council and are replaced by other elected members, to ensure that the actual Council have adequate representation upon the Committees doing the work of the Council." Since when was this discovered in regard to the Research Sub-Committee and the Livesey Memorial Committee? And why was it not acted upon two years ago, when I gave an opportunity to put it into effect then? The explanation must be "new men, new manners." Mr. Tagg says: "During the whole time on that Committee, Mr. Brearley's work was of the utmost value." It may be here interposed that of the three original members two remain, neither of whom is on the Council—Messrs. John Bond and Charles Wood. They, too, have rendered loyal service; but if loyal service is not to count, why did not the Council put into full effect the desideratum of Council representation by making three appointments instead of one? This would have brought the change now under discussion into its true perspective. I am sure my friends Bond and Wood will forgive me for this illustration. I should be the last man in the world to suggest that they ought to be removed in preference to me, or to make way for anybody, because I know too well their whole-hearted service.

The rest of Mr. Tagg's attempted justification that "the Council are responsible to the members for the administration of the funds and the conduct of the affairs of the Institution," . . . "unless you are to get Committees of perfectly unworkable proportions," &c., &c., leaves me cold, as it will any onlooker who has had no part in this business. I have never been under the delusion that I was appointed, as the President (Mr. J. D. Smith) suggested, a life member; but I leave it to the members of the Institution to judge, after the foregoing recital, whether it was not possible to find a nearer approach to gentlemanly treatment.

Mr. Tagg said "there was no personal feeling." I have never suggested there was, for the simple reason that I have never given cause for any. For the same reason I have tried throughout my correspondence on the subject to keep to the point of principle as to whether it is right or not for a Council to treat anyone with a long record of acceptable service as they have done. If they cannot see error in it, it seems to be a case for a physician. If they see error, it is the limit of foolishness not to admit it.

The President said: "Mr. Brearley has really no right to find any fault at all. He has been dealt with very fairly indeed; and on two occasions this matter has been explained to him." But for these remarks, I would not have inflicted the personal narration on the columns of the "Journal." Readers will be able to judge whether it is the mentality of the President and the Council (which he has obviously guided on this matter) that is at fault, or my own. It will be seen that I was made the double victim of the "new policy" in being simultaneously removed from two Committees, one of which does not meet more than once a year; and that the arguments used to justify the one change of representation—expense, &c.—in no way hold for the other. The "new policy" might easily have been initiated in a way that would have left everybody happier, and that to the advantage of the primary interests. Note that the fact that I had been removed from *two* Committees is not referred to either by Mr. Tagg or Mr. Smith.

The Smaller Works.

There is one aspect of this matter that I hope will not escape the notice of the members of the Institution engaged on the smaller works. At the present time on the Research Committee and the Livesey Advisory Committee the smallest representation is of a works supplying over 600 million c.ft. per annum. My professional work, with few exceptions, has consistently brought me into touch with the smaller undertakings; and while I remained on the Committees I felt, at all events, that in me they had a voice. Now that I "have ceased to be a member" this representation is gone. My counsel to the smaller works' members is to see that it is readjusted.

The Smithells Commemorative Fund.

I pass to a more congenial task. It is to express an earnest hope that the effort which is being made to show appreciation of the services rendered to the gas industry by Prof. Smithells will, in the result, be worthy of its object. His work speaks for itself, and words thereon are a redundancy. His mere presence was an inspiration, while in his dealings with men he stood out as one of England's greatest Knights. A cash fund is a small thing to set beside these attributes; but it is something, and affords the sinews whereby the inestimable work of a charming man can be kept in memory.

LOWE'S COMBINED GAS PLANT.

The Therm Yield—Gratifying Experiences.

In the "Journal" for Aug. 9, 1922, we gave a description of the invention of Mr. James Lowe, the Engineer and Manager of the Auckland (N.Z.) Gas Company, Ltd., for the making of water gas in conjunction with coal gas; and working results were then given. Mr. Lowe is in this country for a few months; and we have had an opportunity of a chat with him as to the plant and his working experiences with it. He tells us that the plant was put into operation at the Auckland Gas-Works on April 25, 1922; and it has been the chief factor in causing two reductions in the price of gas, making together 9d. per 1000 c.ft.

The tests previously published in the "Journal" were made immediately after the plant had been put into operation; and some of the figures given have since been considerably improved upon. For example, the gas production for the quarter ended Dec. 31, 1922, averaged 17,400 c.ft. of 510 B.Th.U.—equal to a yield of 88·7 therms per ton of coal carbonized. The therm production per ton of coal will be further increased when the two additional units now in course of erection at the works are put into commission. When this is done, a much greater yield of therms per ton will be realized should the calorific value of the gas supplied be reduced to the neighbourhood of 450 B.Th.U.

A few days before Mr. Lowe left Auckland, a similar plant of smaller capacity was put into work in conjunction with the intermittent verticals at the Company's Devonport works. No tests of this plant have yet been made; but it may be stated that the make of 500 B.Th.U. gas per ton was satisfactory; and the average percentage of CO_2 in the water gas, indicated on a "W.R." CO_2 recorder, was 3 p.ct. during the few days before he sailed.

The plant is automatic; the periodic changing of the valves and dampers being automatically effected by hydraulic mechanism. No water-gas operator is necessary.

The fires are cleaned and ashed out once a shift, and clinkered once a week. The plant does not require to be charged with coke more frequently than once in 24 hours; but it is customary to put coke in once a shift when the fires are being ashed out. The equal periods of blast and run, and the comparatively small blast pressure, have minimized clinkering troubles.

The automatic mechanism has continued to function without failure since the installation of the plant. The water is passed through a filter which eliminates all matter in suspension before it reaches the hydraulic valve. At Devonport, the water for operating the plant is the ordinary town supply, at a pressure of 80 lbs. per sq. in.; and as this is discharged into the boiler-feed tank, the power for operation costs nothing. An examination of the working dampers was made after the plant had been in operation more than a year. All were found in good order; and those on the water-gas side were in perfect condition.

The efficiency of the plant is very high indeed for a variety of reasons, but chiefly because the heat of the blow gas is utilized in heating the coal-gas retorts. The plant can be combined with any existing retort-settings; and the blow gases are auxiliary to the producer gas from the furnaces for heating the retorts. By passing all coke through the plant, complete gasification can be reached if desired; but it will probably be better not to go so far as this. Incidentally, we learned from the conversation that there have been no mishaps or explosions either in lighting-up or running, and that the plant is exceedingly simple in operation.

Mr. Lowe also asks us to make a correction in the article in the "Journal" for Aug. 9, 1922, where the grate area of each producer is given as 16 sq. ft. This figure should be 26 sq. ft.

[Mr. James Lowe asks us to state that during his stay in this country, communications will reach him addressed: "Care of Messrs. John Terry & Co., 7, Great Winchester Street, E.C.]

Gas Interests at the Shipping Exhibition.—The varied application of gas to modern shipping and industry will have a large and important illustration at the forthcoming Shipping, Engineering, and Machinery Exhibition, which opens at Olympia on Aug. 31. Many of the important firms in the industries are showing how gas in some form or other continues to play an all-important part in the development both of means of communication and of motive power. One of the features of this exhibition will be official visits paid by various interested bodies; and on Sept. 10 the Institution of Gas Engineers, together with the Institution of Sanitary Engineers, the Institution of Heating and Ventilating Engineers, and the National Association of Master Heating and Domestic Engineers will be present.

GASEOUS COMBUSTION AT HIGH PRESSURES: NEW EXPERIMENTS.

By WILLIAM A. BONE, D.Sc., Ph.D., F.R.S., Professor of Chemical Technology at the Imperial College of Science and Technology, London.

[A Friday Evening Discourse given before the Royal Institution of Great Britain on May 11—Sir Arthur Keith, M.D., LL.D., F.R.S., Secretary and Vice-President, in the chair.

INTRODUCTION.

IN the course of the researches upon gaseous combustion, which for many years past have been carried out in my laboratories, it became necessary to study the subject under much higher pressures than those heretofore employed. And as this aspect of the work has recently assumed greater importance from the standpoint of the mechanism of combustion than was at one time foreseen, I have chosen it as the theme of my discourse to-night.

The scientific investigation of flame, which originated rather more than a century ago with Sir Humphry Davy's researches in this Institution, has always had a fascination for chemists; and as yet there seems no end to it. For we are still far from understanding completely even the simplest known cases of gaseous combustion; and it is upon some of these that our high-pressure researches have thrown new light.

APPARATUS AND METHOD.

Before, however, proceeding to explain these new observations, it will be necessary for me to say something about the apparatus and methods which have been designed and employed for such work, for they must obviously differ from those ordinarily used for experiments at atmospheric pressure, where the conditions are much less severe.

In the first place, it is necessary to carry out the experiments in specially designed vessels of forged steel, capable of withstanding the sudden development of very high explosion pressures. Thus, for example, the initial pressures at which the combustible mixtures are fired in our experiments range up to 50 and, in extreme cases, even up to 100 atmospheres; and the resulting pressures, which are developed in a small fraction of a second, may be anything up to ten times as great. Hence our explosion vessels and their accessory valves and fittings must be capable of withstanding pressures up to 1000 atmospheres suddenly developed; and the method of measuring and recording pressures must be capable of following accurately, and with the least possible lag, a rise of pressure of from (say) 50 to 500 atmospheres occurring within $\frac{1}{200}$th of a second.

The bomb (fig. 1) which has been employed in our recent experiments* was machined out of a solid forging of open-hearth steel. Outwardly it is cylindrical in outline (10·25 in. long by 8 in. diameter), and out of its central part had been cut a spherical cavity A about 3 in. in diameter (capacity *circa* 240 cc.). It is mounted on a cast-iron stand by means of ball bearings which permit of a rapid rotation of the bomb on its axis, in order to ensure an effective mixing of its gaseous contents before an explosion. As used in an experiment, the bomb is fitted with an admission valve B, an ignition plug C, and a Petavel manometer D.

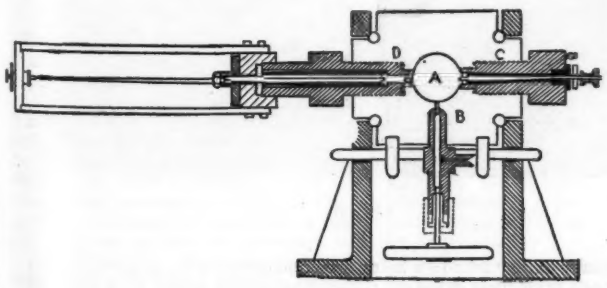


FIG. 1.

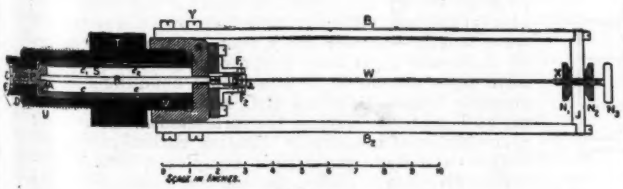


FIG. 2.

The mixtures are ignited by means of a platinum wire heated to incandescence by a direct electric current from a battery of secondary cells (12 volts); and the ignition wire is situated near the wall of the explosion cavity immediately opposite the head of the Petavel manometer.*

An essential part of the installation is the recording manometer of the form designed by Prof. (now Sir J. E.) Petavel in 1905† (fig. 2), which is a most efficient appliance for high-pressure work. Perhaps the action of the gauge will be understood when I say that, together with its optical accessories, it measures, and

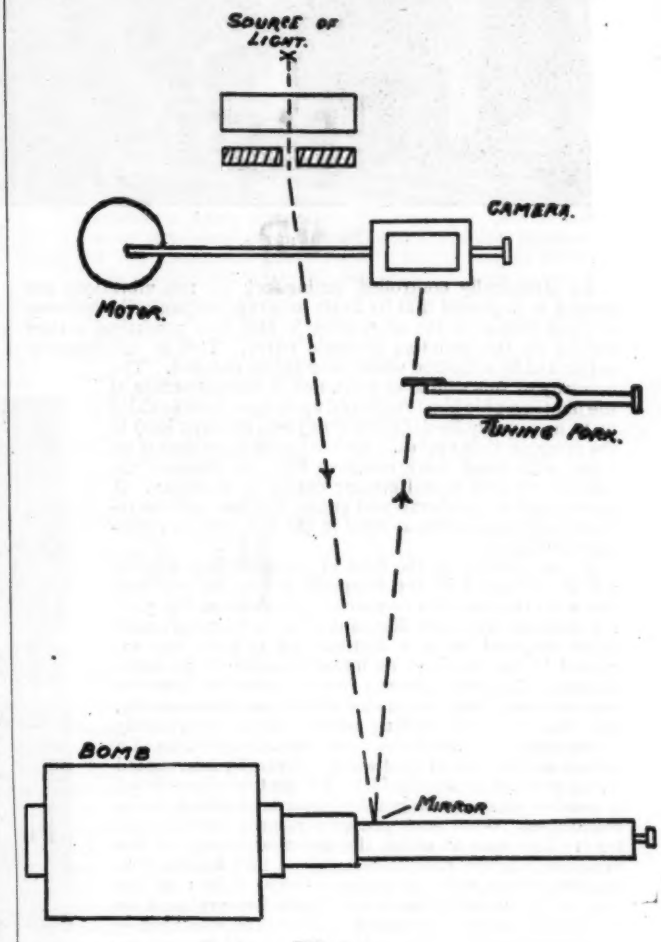


FIG. 3.

by a magnifying device records, the outward bulge on the walls of the explosion cavity caused by the pressure developed when the combustible mixture is fired therein. Now the time period θ of a vibrating system is related to W, the weight of its moving parts, and to the force A required to produce unit deflection, as follows:

$$\theta = 2\pi\sqrt{\frac{W}{Ag}}$$

In the Petavel gauge the time θ is made as short as possible consistent with the required strength (W) to withstand the sudden development of extremely high pressures, by making A, the controlling force brought into play per unit length of motion, as large as possible; or, in other words, by using the stiffest spring possible. By such means the time lag in registering the pressure is reduced to a minimum, which is always a most important consideration in experiments of this kind.

The spring of the gauge is tubular in shape. The actual motion produced in it by the explosion is exceedingly small; and for recording purposes it is highly magnified, first of all (*a*) by a special lever device in the gauge itself, and then (*b*) by an outside optical arrangement (fig. 3) which focuses a point source of light upon a rapidly revolving drum, to which is attached a sensitive photographic film. The source of light now employed by us is a 1000 c.p. "Pointolite," the intensity and steadiness of which enables us to obtain exceedingly good pressure records.

* I must here acknowledge the devoted assistance in these researches of the late W. A. Hayward, M.Sc., who lost his life in a deplorable accident whilst engaged upon them, and afterwards of Messrs. D. M. Newitt, B.Sc., D.I.C., and D. T. A. Townend, B.Sc., D.I.C., who are still collaborating with me.

* A full description of the bomb and principal accessory appliances employed in the research will be found in Phil. Trans. Roy. Soc., A. 215 (1915), pp. 275–363.

† *Vide* "Phil. Trans. Roy. Soc.," A. 215 (1915), p. 363.

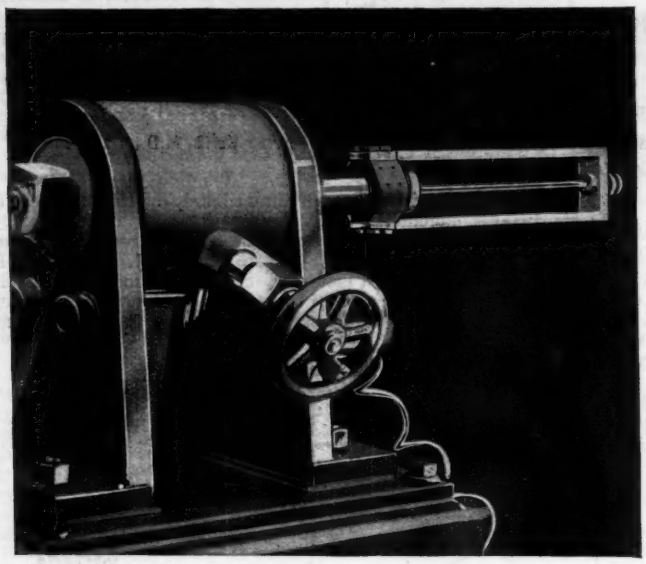


FIG. 4.

An electrically controlled tuning-fork of 100 vibrations per second is so placed that its beats interrupt momentarily the beam of light falling on the photographic film, thus producing a time record on the resulting pressure curve. This is subsequently calibrated by a method which need not be detailed. The intensity of this source of light, and the sensitiveness of the photographic films employed up to now, have enabled us to measure quite definitely 0·005 sec. (or even less) in the pressure-time curves. And in future experiments we hope, with some more sensitive films, to measure the time factor with a still greater degree of accuracy. A photograph of the bomb and gauge, together with the recording arrangements as used in the research, is reproduced in fig. 4.

As an example of the kind of pressure-time records actually obtained by the foregoing means, we will now throw on the screen a (negative) reproduction (fig. 5) of a portion of one of our films showing the rising pressure curve obtained when a fast-burning mixture was exploded in the bomb at an initial pressure of 50 atmospheres. You will observe how quickly the pressure rose to a maximum (somewhat above 400 atmospheres), and then how the cooling period set in immediately afterwards; the time being recorded in hundredths of a second as the beam of light was momentarily interrupted by the beats of the tuning-fork. On the table is exhibited a number of the photographic records obtained in our researches. What such pressure records show chiefly is: (1) The rate at which the potential energy of the explosive mixture fired is transferred into kinetic (*i.e.*, pressure or temperature) energy of the products; (2) the ratio of the maximum pressure attained on explosion to the initial pressure at which the mixture was fired—usually denoted P_m/P_i; and (3) the rate of the subsequent cooling. From a study of these and other features of the records we are able to draw conclusions as to certain fundamental aspects of the combustion process itself.

Some Features of the Combustion of Hydrogen and of Carbon Monoxide in Air.

As an example of the potentiality of high-pressure explosion research to reveal and elucidate new factors in gaseous combustion, I propose to deal mainly with the cases of hydrogen and carbon monoxide. For though at first they may seem to be of the simplest type, yet they present features of extraordinary interest and complexity which for many years chemists have vainly tried to explain. And even engineers, who study internal combustion problems in their own way, without troubling themselves overmuch with the mechanism of the chemical changes involved, are seeking light upon what is termed the "suppression of heat" in such explosions. Indeed, our present ignorance about these matters shows how far we are from really understanding the elements of gaseous combustion, and the need there is of much further fundamental research thereon.

From a chemical standpoint, there has always been something enigmatical about the apparently very different behaviour of the two simplest combustible gases, hydrogen and carbon monoxide, when burning in air. For though their volumetric heats of combustion (assuming the initial and final temperatures to be both about 15° C.) and the proportion by volume in which each of them combines with oxygen are the same—

$$\left.\begin{aligned} 2H_2 + O_2 &= 2H_2O \ldots\ldots 68{\cdot}4 \\ 2CO + O_2 &= 2CO_2 \ldots\ldots 68{\cdot}0 \end{aligned}\right\} \text{ K.C.U.S per gramme-molecule,}$$

yet in many respects their modes of combustion in air present a striking contrast.

Thus, for example, (1) the appearance of a flame of hydrogen in air is very different from the lambent blue flame of carbon monoxide burning at the same orifice and under the same pressure; (2) hydrogen-air mixtures have lower ignition temperatures, and, under similar physical conditions, propagate flame much faster than the corresponding carbon-monoxide-air mixtures; (3) the presence of even a minute quantity of steam greatly assists, if it is not absolutely essential to, the oxidation of carbon monoxide in flames even when detonation is set up. Thus a flame of the dry gas is easily extinguished on being introduced into a jar of air which has been previously dried over strong sulphuric acid; (4) a flame of carbon monoxide burning in air loses by radiation nearly 2·4 times as much energy as a hydrogen flame of the same size; also (5) the two radiations have their own characteristic wave lengths—namely, 2·8 μ from a carbon-monoxide-air flame and 4·4 μ from a hydrogen-air flame—which have been attributed to vibrational conditions in incipiently formed CO_2 and H_2O molecules respectively, or, as I prefer to say, to the formation *at the moment of combustion* of intensively vibrating carbon-monoxide-oxygen and hydrogen-oxygen complexes, which ultimately give rise to carbon dioxide and steam molecules respectively.

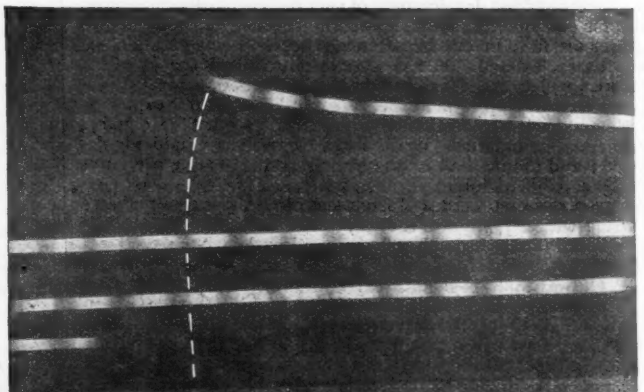


FIG. 5.

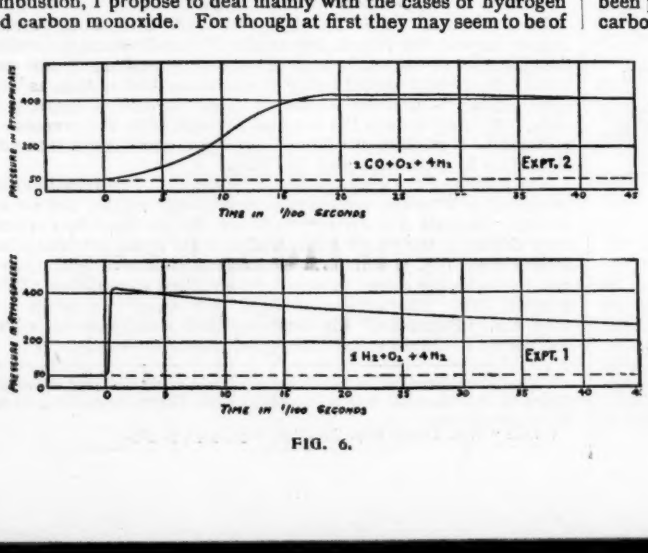


FIG. 6.

On the table before you are the flames of hydrogen and carbon monoxide respectively, burning side by side in air at the same pressure and through orifices of similar diameter, so that you may visualize the striking difference between them. The much slower propagation of flame through normal carbon-monoxide-air than through normal hydrogen-air mixtures will next be shown by successively igniting each of them in a vertical glass tube about 20 in. long and 1½ in. in diameter. Finally, in order to prove how the combustion of carbon monoxide depends

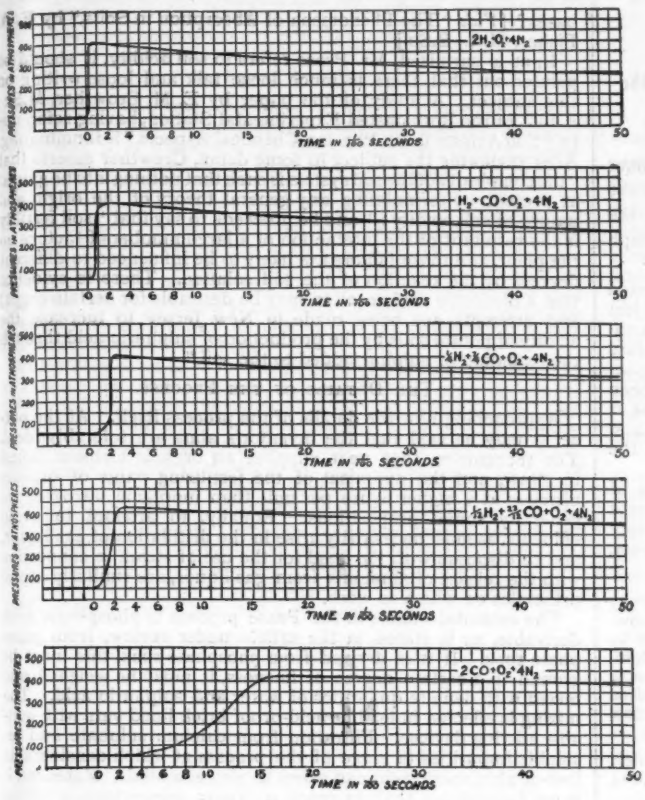


FIG. 7.

on the presence of steam, we will now make the familiar experiment of extinguishing a flame of (dry) carbon monoxide by lowering it into a jar of air which has been previously dried over strong sulphuric acid.

To summarize: Carbon monoxide burns in air more slowly and with a more highly radiating flame than does hydrogen; also, apparently, the presence of some steam or other hydrogen-containing substance is necessary for its combustion. Precisely how steam accelerates or determines the combustion of carbon monoxide (and only a minute quantity suffices) has up to now never been completely explained; but chemists are generally agreed that carbon monoxide molecules are particularly inert towards oxygen molecules in flames. Indeed, I think there are grounds for believing that in ordinary flames carbon monoxide cannot react with undissociated oxygen molecules, but that it requires the presence of either: O atoms or "activated steam" : OH_2 molecules.

High-Pressure Experiments.

Bearing the foregoing considerations in mind, let us now see what new light has been shed on the problem as the result of high-pressure combustion research. Here it should be pointed out that, inasmuch as the chief difference between the conditions of high and low pressure experiments lies in the absolute concentration of the interacting molecules, it may be expected that factors the operation of which chiefly depends on such concentration will become more dominant as the pressure rises. Indeed, the value of high-pressure work lies in the fact that it tends to show up and accentuate the operation of factors the influence of which may be either masked or overlooked at ordinary pressures.

One of the first things we learnt in our experiments was the absence of any direct relation between the rate at which the potential energy of an explosive mixture is transferred on explosion to its products as sensible heat (pressure) and the magnitude of the chemical affinity between its combining constituents. Thus, for example, the time required for the attainment of maximum pressure on exploding at 50 atmospheres a methane-air mixture ($CH_4 + O_2 + 4N_2$), in which the combustible gas and oxygen are present in equimolecular proportions (*i.e.*, corresponding to the primary chemical interaction in the flame), was many times longer than that required in the case of the corresponding hydrogen-air mixture ($2H_2 + O_2 + 4N_2$), notwithstanding the fact that the affinity of methane is at least twenty, and possibly as many as thirty, times as great as that of hydrogen for oxygen in flames. In other words, the avidity with which a combustible gas seizes upon oxygen in flame combustion is not necessarily the factor which mainly determines the rate at which the potential energy of the mixture is transferred into kinetic energy of its products.

Another thing that came to light during the early stages of our work was that, whereas what may be termed the "mass influence" of hydrogen upon the actual distribution of oxygen between the combustible constituents of a burning mixture is proportional to the square of its concentration, that of carbon monoxide is nearly proportional to the first power thereof. This can hardly mean otherwise than that, whereas the primary oxidation of hydrogen in flames involves the simultaneous action of two H_2 molecules, that of carbon monoxide does not require the action of more than one CO molecule.*

Our later experiments have chiefly dealt with the explosion, usually at an initial pressure of 50 atmospheres, of what may be termed isothermic mixtures of either carbon monoxide or hydrogen with sufficient oxygen for complete combustion, *plus* some variable diluent developing as nearly as may be the same amount of energy on combustion. With the aid of a series of slides showing the character of the pressure curves, I will now endeavour to explain their significance.

The Contrast Between Carbon-Monoxide-Air and Hydrogen-Air Pressure Curves.

We may appropriately begin with a consideration of two typical pressure-time records (fig. 6) obtained when normal carbon-monoxide-air and hydrogen-air mixtures ($2CO + O_2 + 4N_2$, and $2H_2 + O_2 + 4N_2$)† were respectively fired in the bomb at an initial pressure of 50 atmospheres.

Now, though these two mixtures developed as nearly as may be the same total amount of energy on explosion, there was a striking contrast between the character of the pressure-time curves obtained. For whereas in the typical hydrogen-air curve the pressure rose with extreme rapidity (actually in 0·005 second) to its maximum (about 400 atmospheres), and almost immediately thereafter began to fall and assume the character of a simple cooling curve, in the corresponding carbon monoxide curve the pressure rose much more slowly and only attained a maximum (about 410 atmospheres) after 0·18 second, after which it was maintained almost at its maximum for a considerable time interval. The comparative slowness with which pressure energy is developed in such a carbon-monoxide-air explosion, together with a considerable exothermic effect always observed after the maximum pressure had been reached, were, indeed, very remarkable and significant features of our experiments. At first we were inclined to attribute them to the supposed "slow-burning" property of carbon monoxide as compared with the "quick-burning" of hydrogen; but further experiments revealed the operation of another totally unexpected factor—namely, the presence of nitrogen, which, as we discovered later, is not inert, but acts as an "energy-absorber" in the combustion of carbon monoxide at such pressures.

Effect of the Addition of Hydrogen upon the Carbon-Monoxide-Air Curve and upon a Carbon-Monoxide Flame Burning in Air.

It was next discovered that the replacement, even in very small proportions, of carbon monoxide by its equivalent of hydrogen in the aforesaid normal carbon-monoxide-air mixture had a disproportionately large influence in accelerating the rise of pressure on explosion. This remarkable result is brought out in a series of curves (fig. 7), which demonstrate the effects of progressively replacing from one-twenty-fourth up to one-half of the carbon monoxide by its equivalent of hydrogen in the original mixture exploded. At first sight it seemed as if the hydrogen had imposed its own character upon the whole course of the carbon monoxide combustion, even when the combustible part of the mixture exploded contained only one part of hydrogen to twenty-three parts of carbon monoxide by volume.

In this connection, it may be mentioned that the addition of a moderate amount of hydrogen to carbon monoxide burning in air at ordinary pressure has a considerable effect upon the character and spectrum of the flame—a circumstance which seems to be of some significance in relation to the mechanism of carbon monoxide combustion. And in conjunction with Prof. A. Fowler, of the Imperial College, we are now investigating it more closely, with a view to finding out its meaning. But the facts as now known warrant us in concluding that the addition of a comparatively small proportion of hydrogen has a peculiar influence upon the combustion of carbon monoxide, whether at high pressures (as in our bomb experiment) or in flame combustion at ordinary pressures.

* The experimental evidence for the foregoing statement will be found in "Phil. Trans. Roy. Soc.," A. 215 (1915), pp. 296–308 and 313–318.

† It should be understood that throughout this discourse the expression a "normal carbon-monoxide- (or hydrogen-) air mixture" means a mixture of the combustible gas with the amount of air theoretically required to burn it to carbon dioxide (or steam).

(To be continued.)

Eastern Counties Gas Managers' Association.—It has been arranged that the autumn meeting of this Association shall be held at Tottenham on Sept. 12 next. Members are asked to make a special note of the date.

Masonic.—In connection with the annual conference of the British Commercial Gas Association at Birmingham, the Murdoch Lodge are proposing to invite those members who are Freemasons to a meeting of the Lodge on the afternoon and evening of Wednesday, Oct. 3.

"N. P. K." FERTILIZER.

An Examination of its Claims, Method of Production, and the Chemistry of the Process.

By "Questor."

It is well that a careful examination and analysis of the account of the above fertilizer should be made. For this purpose the article by Mr. E. Lloyd Pease, of Darlington, appearing in the "Journal" for June 20, can be conveniently perused paragraph by paragraph.

In attempting to widen the vista for gas engineers and interested technicians, it is not desired to indulge in strictures. The object of this article is merely to stimulate consideration; and, if subsequently found to be justified, to call for further research before leading one to embark on any appreciable expenditure in connection with the process. However much experimenting has been done, the account of the "N. P. K." fertilizer reveals that it would have been prudent to continue this preliminary and essential work still further before directing the attention of the gas industry thereto.

The statement bespeaks the inventor, and not the man of science—if their relative traits are truly defined in the recent Presidential Address at the annual general meeting of the Society of Chemical Industry at Cambridge, when *à propos* this aspect, Dr. E. F. Armstrong, F.R.S., said:

> Men of science necessarily proceed step by step along the pathway of known facts in searching for their conclusions, seeking knowledge, maybe, for the sake of knowledge—which I hold not in itself to be a thing ignoble—maybe for the sake of wisdom, seldom for the sake of gain. The inventor, like the dreamer, is impatient of him who would always verify his route, and often seeks to reach the goal at the risk of being accused of vagueness by the scientist who seeks to follow him.

That there are certain phases affecting the Pease process which are incomplete and dubious, will be made evident as the writer proceeds.

The claim of this process is that ammonia is extracted from gas, and concurrently becomes a constituent part of the mixed fertilizer ready for use. One is tempted to premise that, in the supply of coal gas, to use biblical phraseology, you must "hold to the one, and despise the other." In other words, the primary object of the gas industry is to ensure the production and supply of a suitable and uniform quality of coal gas. This implies, relatively, that everything else is secondary. This observation may not apply to coke-oven works with the same cogency; but as coke-oven gas appears destined to be used in localities where coal gas has hitherto been supplied, increasing importance obviously attaches to the premise in question.

The New Fertilizer and Compound Manures.

It is feared that Mr. Pease unwittingly casts a slur on the fertilizer industry in the second paragraph of his statement. Therein his remarks are tantamount to an enunciation of the osmosis theory of the assimilation of the nutrient constituents of fertilizers by plant rootlets. The soundness of this hypothesis will not be gainsaid. But what is doubted is whether "N. P. K." fertilizer will be more effective in action than the compound manures which have hitherto held the field.

One significant development of the fertilizer industry during the last two decades has been the improvement in the production of compound manures. This is not alone due to the introduction of "batch" and other special mixtures (the principle and details of some of which are jealously guarded), but is in no small degree attributable to the remarkable advance in the methods of manufacture and the improved quality of calcium superphosphate, sulphate of ammonia, and the means of conditioning kainite.

Mechanical dens have been introduced into all superphosphate works of importance. The fine cutting and aeration, which are combined features of the new appliances, lead to the production of mono-calcium phosphate, which rapidly matures and, on breaking down from the store heaps, is dry and sand-like in character. Thus all the ingredients are in a peculiarly suitable physical condition for incorporation. There is no difficulty in ensuring that uniformity and intimacy of admixture, even in the proportions named, which Mr. Pease appears to doubt.

Whether the Pease process provides, as is claimed, a cheap and effective way of extracting ammonia from gas remains to be seen. Sufficient data have not been vouchsafed to admit of the preparation of a balance-sheet showing cost per unit volume of gas freed from ammonia.

The Acid Radical and Soil Acidity.

In proceeding to give a brief description of his process, Mr. Pease indulges in preliminary observations to the effect that "three-fourths of ammonium sulphate—viz., the sulphuric acid radical—is not only useless for manurial purposes, but may be actively harmful." Reasoning from the same postulates, it must be remembered that the sulphuric acid radical in sulphate of potash (which is a constituent of the mixed fertilizer) will be equally useless for manurial purposes, and, conceivably, actively harmful to the same degree. But is there not evidence to support the view that acid radicals fall into line with the absorption of bases? [*Vide* "The Phenomena of Absorption in Soils," by E. A. Fisher, M.A., B.Sc.]

If, as is surmised, Mr. Pease refers to soil acidity, it should be pointed out that there is much loose talk and loose writing on this subject. A study of the paper by E. M. Crowther, M.Sc., A.I.C., of the Rothamsted Experimental Station, having reference to "Soil Acidity in its Physico-Chemical Aspects" is illuminating. After reviewing the subject in some detail, Crowther asserts that "the complexity of the soil system is such that nothing is to be gained at present by formulating any general theory of the origin and nature of soil acidity;" and he proceeds to say that "soil fertility is the resultant of the interaction of a large number of factors on the plant, and these factors are likely to be influenced to different degrees by the reaction of the soil solution. There is evidence that a distinctly acid reaction may be desirable for certain crops; and attempts are being made in New Jersey to increase the acidity of potato soils by the production of sulphuric acid through the oxidation of sulphur added to the soil."

The Details of the Process.

Approaching now the details of the process itself. At the outset it may be said that the inventor's aims are tolerably ideal. The recognition that peat supplies an organic element found in straw, and the appraisal of the fertilizing value of organic nitrogen at a higher figure per unit than inorganic nitrogen, are generally sound propositions. Equally, to attempt to avoid effluents, as must necessarily arise in the distillation of gas liquor, and to dispense with the need for the use of steam in connection with the release of ammonia from gas liquor, are similarly sound principles on which to work.

The essential vehicle in the Pease process is phosphoric acid, derivable, as is stated in the article under review, from phosphate rock. If it is derived from phosphate rock, this must be ground to a certain degree of fineness, it must be weighed, and mixed with definite quantities of water and sulphuric acid. The mixing is effected in lead or acid-proof brick lined vats with suitable stirring devices. Filtration from calcium sulphate and insoluble impurities (a stage of the process at which considerable loss of phosphoric acid can arise) is also essential. Moreover, it is not improbable that, to reach a proper concentration for the process, evaporation may have to be resorted to. If phosphoric acid is obtained *vid* superphosphate, digestion or lixiviation of the latter will be essential; and here again the extract may need to be evaporated.

Quite irrespective of the above operation, it is necessary to mix sulphate of potash with the phosphoric acid, and incorporate these satisfactorily with peat moss litter (or some other "sponge"). What is the estimated cost of the purifying medium, what volume of gas can be purified per unit weight, and what labour is entailed in the purification operation itself?

As regards the apparatus. Whether a revolving tube is preferable to the ordinary type of oxide of iron purifiers, having suitable layers of the material, and arranged in such a way that the purifiers can be worked alternately, remains to be seen. Everything depends on the physical texture of the purifying medium. Dry purification involving the handling of materials is not regarded with too much favour by the gas industry. Otherwise, there would have been no chemical investigations and no drastic attempts to remove hydrogen sulphide, &c., by wet methods. It must be borne in mind that the passage of crude coal gas through an additional dry purifying medium will involve extra power, in order to overcome the resistance to the gas which will be exerted by the material in question. From many points of view, it would appear preferable (assuming the practicability of the Pease process is established) to use a double superphosphate of suitable physical texture rather than the medium indicated by Mr. Pease. Sulphate of potash and peat moss could be usefully incorporated extraneously, as, from the point of view of the purification of gas from ammonia, they are diluent materials.

The "Novelty" of the Basic Principle.

Of course, it must not be concluded that the proposal of Mr Pease is peculiarly novel, as regards the basic principle involved. One is led to recall Bolton and Wanklyn's process, known over thirty years ago, by which the ammonia in coal gas was absorbed by passing it through calcium superphosphate placed in ordinary oxide of iron purifiers. Was not this process tried at the Munich gas-works, and introduced to many others in subsequent years? Has the history and operating records of this process been traced? Why was it abandoned after trials revealed that superphosphate could absorb 7·5 p.ct. of ammonia, and that only 10 grains per 1000 c.ft. of gas could be found after purification with superphosphate?

In submitting the chemical reactions having reference to the process and in elucidating the economy in sulphuric acid, Mr. Pease proceeds on the assumption that ammonia is the only gaseous constituent he has to contemplate in the purification of gas. He appears to ignore the existence of carbonic acid and hydrocyanic acid—normal constituents of crude coal gas. It is tolerably certain that the tri-ammonium basic stage will not be reached on account of the presence of carbonic acid in the gaseous stream passing through the purifiers. The best it will be possible to secure will be di-ammonium phosphate; and even this stage may not be completely attained, except with the by-passing of ammonia. Moreover, the product, whether di-ammonium phosphate or something short of this, may be in a toxic condition due

to the presence of thiocyanates, and harmful for application to plant rootlets.

The saving in sulphuric acid will not be 66·6 p.c., but, at most, 50 p.c.

THE ECONOMIC ASPECT.

Examining now the economic aspect. It is one thing to show an economy of 50 p.c. of sulphuric acid by chemical equations; it is quite another thing to justify such economy as a sound commercial, or economic, proposition. By way of elucidation, prevailing prices may be examined. The selling price to-day of phosphoric acid, 1500 quality, which is equivalent to 56 p.c. P_2O_5, is £33 per ton. This represents a price of 11s. 8d. per unit of P_2O_5. The selling price of 35 p.c. (say, 16 p.c. P_2O_5) superphosphate in bulk is 65s. per ton. This represents (say) 4s. per unit of P_2O_5. Assume that the P_2O_5 in the phosphoric acid which Mr. Pease proposes to use costs the mean of the two figures given above—viz., 7s. 10d. per unit of P_2O_5, an obviously equitable and reasonable figure to take.

The selling price of sulphate of ammonia to-day may be taken at 11s. 9d. per unit of NH_3. Assume that the cost of NH_3 in "N. P. K." is merely the value of ammonia in gas liquor—say, 4s. 6d. per unit of NH_3. Assume also that the purchase price of K_2O in sulphate of potash is 4s. per unit. From these basic figures, it is possible to construct an account showing the cost of "N. P. K." fertilizer of given constitution by the Pease process (giving that process the advantage of all costs of production), and the cost of an identically testing compound manure derived by mixing calcium superphosphate, sulphate of ammonia, and sulphate of potash, and neglecting the small cost of mixing.

Let it be assumed that the analysis of "N. P. K." fertilizer is 4 p.c. NH_3, 10 p.c. P_2O_5, and 4 p.c. K_2O.

Cost by the Pease Process.

	£	s.	d.
4 p.c. NH_3 at 4s. 6d.		18	0
10 p.c. P_2O_5 at 7s. 10d.	3	18	4
4 p.c. K_2O at 4s.		16	0
	5	12	4

Cost by the Compounding of Calcium Superphosphate, Sulphate of Ammonia, and Sulphate of Potash.

	£	s.	d.
4 p.c. NH_3 at 11s. 9d.	2	7	0
10 p.c. P_2O_5 at 4s.	2	0	0
4 p.c. K_2O at 4s.		16	0
	£5	3	0

In face of such figures as these, it would seem that Mr. Pease is confronted with an economic problem. This does not imply that it is incapable of solution; but none the less, it is a problem which should be seriously contemplated.

But even supposing the "N. P. K." fertilizer can ultimately be produced satisfactorily and economically, it is not to be imagined that the demand for ammonium sulphate will languish. Some crops deplete the soil of one constituent; others of another. Hence the necessity for the rotation of crops, and equally for the application of individual fertilizers, such as sulphate of ammonia, &c.

Further observations concerning the "N. P. K." fertilizer could be made; but limits of time and space do not allow. Enough, however, has been said to stimulate interest in the new fertilizer, and in the writer's view to warrant not only additional research of the chemical aspect, but to justify further study of the chemical engineering and economical phases of the process.

Testing and Accuracy of Meters.

In the course of a discussion on meter testing and repair, before the Eastern States Gas Conference, Mr. H. A. Norton, of Boston (Mass.), recommended a seven-year periodical test of meters, and a fourteen-year periodical repair. New Hampshire, he said, has a five-year periodical test date; but many of the meters tested had been in service longer than this. The tolerance by law in that State is 2 p.c. fast or slow; and a report of the test of all meters removed from service is forwarded to the Commissioners. It has been stated by the Engineer that the rule requiring the testing of meters implies that a reasonable accuracy to be expected of a gas-meter is between the range of 3 p.c. fast or slow. On this basis, he found that 7·1 p.c. of the meters tested were fast; the average error of the fast meters being 5·1 p.c. There were 6·5 p.c. slow meters; the average error in this case being 7·8 p.c. This would indicate that 85 p.c. of the meters tested were correct with a 3 p.c. tolerance. An analysis of meters tested elsewhere in New England, based on a 2 p.c. tolerance, revealed about 70 p.c. correct. When these meters were segregated as to size and age, the records showed, on a seven-year basis of new or repaired five-light and larger meters, about 80 p.c. correct. Meter tests from one company having in service some 50,000 meters, indicated that of the five-light and larger meters over 80 p.c. were correct; while of their three-light meters (twenty or more years old) 54 p.c. showed correct. Another company, continuing in service up to twenty years without repairs those meters which tested correctly each five years, found that of the meters which were correct after fifteen years of service and tested after twenty years of service, there were only 52 p.c. correct.

YORKSHIRE JUNIOR GAS ASSOCIATION.

Visit to the York Gas-Works.

The final gathering of the session of the Association took place on July 14, when a party of over fifty members travelled from most parts of Yorkshire to the county's ancient and beautiful capital city, to visit the works and showrooms of the York Gas Company, by invitation of the Directors and Mr. H. E. Bloor, B.Sc., B.Eng., the Engineer and General Manager.

The visitors assembled at the large and well-appointed showrooms of the Company, where the public of York and a wide county area can see in operation practically every kind of gas-appliance on the market. Two model rooms are arranged, with an attractive and distinctive scheme of decoration, which met with unanimous appreciation. From the showrooms, the members proceeded to the works, where a detailed tour of inspection was conducted by Mr. Bloor and members of his staff. Questions were asked on many points, and answered freely and fully by the guides, who explained the features and working results of all parts of the plant.

Prior to the war, it was mentioned, the entire plant was operated manually. The retort-house machinery, conveyors, &c., which were installed in the early days of the war, were the subject of a great deal of attention. The De Brouwer conveyor, it was stated, is 854 ft. in length, and at the time of installation was the longest in existence. The stacking of coke was seen to be excellently arranged. In the retort-house are De Brouwer and Guest-Gibbons machines and a Jenkins crusher. All the coal carbonized is sampled by the aid of a grinding machine, which extracts a representative portion from the bulk passing to the hoppers. The coke-washing plant was not working; but it was closely examined. The members noted a large retort-house, erected in 1881, and at present used as a store, which, suggested Mr. Bloor, might very well make a good purifier house in the future. The present purifier house was visited, together with the exhauster house, the laboratory, and the drawing offices. A Glover-West installation of vertical retorts of 2½ million c.ft. capacity is in course of construction; and there is every prospect that its working may be commenced by the end of the present year. The visitors, naturally, were particularly interested in what could be seen of this new plant.

After the inspection of the works, the members were conducted to Terry's Café, where tea was provided by the Chairman and Directors of the Company. Following an enjoyable repast, the President of the Association (Mr. H. L. Bateman, of Wakefield) said the visit had been highly instructive, and the members were particularly grateful to Mr. Bloor, who had put himself to so much personal trouble on their behalf. A resolution of thanks to the Chairman and Directors and Mr. Bloor was proposed by Mr. S. H. Packer (Bradford), who declared that they had spent a most profitable day. The proposition was seconded by Mr. F. Lodge (Wakefield), who said the members were delighted with the visit.

Mr. Bloor, in responding, remarked that it had been a great pleasure to receive the visitors. The Chairman of the Company (Mr. Alfred Proctor) was keenly interested in gas affairs generally, and in the progress of junior gas men; and he asked that his apologies should be expressed for his inability to be present that day. He (Mr. Bloor) also was always anxious to do anything in his power to further the welfare of the gas industry and of those engaged in it. It was for them all, whatever position they might occupy, to do their bit towards helping things along. ["Hear, hear."] One of the finest things in life was when a man could regard his work as his hobby, as well as a source of livelihood; and he was convinced that the Junior Associations were doing a great deal to cultivate this spirit. The more enthusiasm they had for their work, the greater would be their success and that of the industry.

Gas Used for Making Hats.

The important part that may be played by gas in the manufacture of women's hats is pointed out by the "Intercolonial Gas Journal of Canada." As soon as shapes, &c., are decided upon, the models are forwarded to the moulder, who casts aluminium dies, which enable the hat manufacturers to make up the popular styles in large lots. Gas-fired furnaces are employed for melting the composition used in casting the dies. In shaping the hats, the upper half of the die is heated by a small perforated copper coil burner arranged to conform with the shape of the die. The press is then closed for about two minutes. Another method is by using a hydraulic press, and heating the straw or felt by steam generated in a gas-fired boiler. In making shapes for higher-priced hats, instead of having presses or stamping machines, the work is done by hand, with a gas-fired hatter's iron, internally heated. After the hat is shaped, it is sized with a glue composition, so that it will retain its shape, and dried in a room heated by steam coils or indirect gas-fired radiators. A gas-fired steam-boiler is used for dyeing and finishing the feathers employed in trimming hats. Gas-fired steam-boilers are also utilized in the manufacture of artificial leaves, flowers, and other decorations. The material is generally linen or muslin, which is dyed, starched, and strapped on a frame, and is then hung in a drying oven heated by gas.

REGISTER OF PATENTS.

Detachable Stands for Utensils on Gas-Stoves. No. 198,938.

MORTON, A., of Dublin.

No. 21,870; Aug. 11, 1922.

This invention relates to detachable stands applicable to gas-stoves or the like and arranged in such a manner as to project over the side of the stove, so that, when the top of the stove is too crowded or it is desired to remove one or more utensils, there is no necessity to move some distance away from the stove.

Gas-Fire Exit Flues.—No. 198,954.

OAKLEY, P., and STOVES, LTD., both of Warrington.

No. 26,399; Sept. 30, 1922.

The object of this invention is to provide for gas-fires an improved arrangement of adjustable exit flue, which can be set at any angle to suit the opening of the ordinary fixed chimney.

The patentees refer to a form of flue consisting of curved faces on the fixed portion of the framework of the fire at the rear, such curves being formed transversely of the stove, and in conjunction with the curved faces a separate discharge nozzle to correspond with the curves on the fixed portion of the stove. This nozzle can be moved within limits of about 45°, and by reversing its position a total adjustment of 90° can be obtained.

The present invention consists in forming the fixed part of the flue at the rear, with flat faces running transversely and forming a number of sides of a polygon, and in conjunction with such sides employing an adjustable reversible nozzle having also a number of flat faces running transversely and adapted to form corresponding sides of a polygon.

Controlling the Supply of Steam to Water-Gas Generators.—No. 199,072.

MOORE, S., and HUNTER, CHARLOTTE, both of Upper Woburn Place, W.C. 1.

No. 4471; Feb. 15, 1922.

No. 15,035; May 29, 1922.

This invention relates to means for controlling and regulating or varying the supply of steam to water-gas generators or to combined coal-gas and water-gas generators, or the like.

The patentees point out that towards the end of each run period there is usually an excess of steam owing to the cooling of the incandescent body of fuel into which the steam is delivered, with the consequent production of an undesirable quantity or proportion of carbon dioxide in the gas; and this invention is designed, *inter alia*, to reduce the CO_2 content of the gas and also to economize the steam, at the same time producing higher calorific quality and greater quantity of gas by passing the maximum amount of steam required during the earlier portion of each run and afterwards automatically and gradually reducing the supply of steam as may be required.

In general, the claims cover hydraulically operated means for causing the gradual accumulation in a chamber of a liquid admitted thereto at a predetermined rate of flow, thereby raising a float (in the chamber) arranged gradually to operate a valve controlling the supply of steam or air; the speed of reduction of the supply varying with the rate at which the liquid is caused to accumulate in the float chamber.

Details of design of the apparatus are, of course, included.

Dry Gas-Meters.—No. 199,077.

FOX, T., and ROBINSON, S., both of Liverpool.

No. 6792; March 8, 1922.

The present invention, relating to dry gas-meters, has for its object to diminish the size, and thereby to cheapen production. Another object is to standardize the manufacture so as to avoid the complicated and individual assembly of component parts. In this way the rapidity of production is considerably increased.

The method of construction is clearly indicated in the claims, which cover a dry gas-meter:—

1.—In which the valve plate, stamped out of a sheet of metal, is further stamped to show the positions of assembly of the parts to be mounted thereon.

2.—In which the bracket supporting the cranked valve-spindle, indicating mechanism spindle, and the prepayment mechanism spindle, is formed of a single stamped metal plate, afterwards rigidly secured in position on the valve plate.

3.—In which replaceable brass sleeves are inserted in the bearings formed in the sheet metal support.

4.—In which the connections between the supporting bracket and both the valves and indicating mechanism are individually adjustable, substantially as described.

5.—Constructed by stamping a valve plate to the required size, marking the plate by a stamping operation with the positions of the members to be mounted thereon, rigidly securing the members thereto, and making individual adjustments for the setting of each moving part.

6.—With a valve plate cut to size and stamped to show the positions of assembly of parts to be mounted thereon, &c., with the valve apertures cut out, all in a single operation.

Automatic Gas-Lamp Control.—No. 199,132.

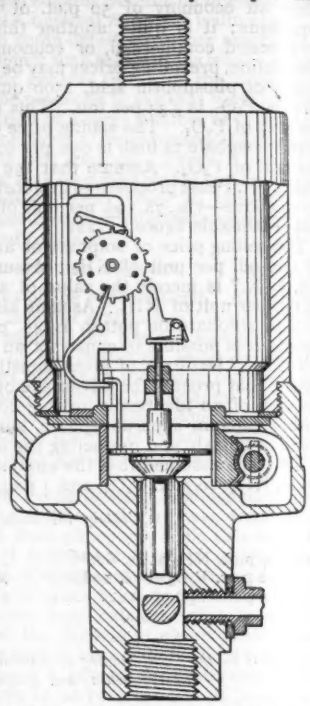
BROWN, A., of Platt Bridge, near Wigan.

No. 7668; March 16, 1922.

This invention relates to gas-lamps of the kind wherein the lamps are lighted or extinguished automatically by variations of pressure in the mains, causing impulses to impart step-by-step motion to pawl and ratchet mechanism.

The present invention consists in improved means, in such mechanism as is shown in the drawing, to retain the valve in the raised position.

The gas for each lamp or series of lamps passes through a valve-controlled orifice loaded so that with the normal day-time pressure the valve will remain closed. When the normal night-time pressure, or a pressure in excess thereof, is forced into the main, the valve is raised and imparts a step-by-step motion to a toothed wheel, which is provided with a second set of teeth or projections in ratio to the first set as one is to two and adapted to control a hooked member which engages a projection on the valve, and holds it in the raised position until moved out of the path of the projection by the two-to-one mechanism.



Brown's Pressure-Wave Mechanism.

The arrangement will be understood from the drawing, which shows the position after one impulse has moved the ratchet wheel one tooth and resulted in the holding-open of the valve.

Assuming it is now desired to close the valve, a momentary pressure in excess of the normal night-time pressure is produced, which causes the valve to rise further and rotate the pawl wheel another tooth. This further movement of the pawl wheel causes the next side pin thereon to engage the top end of the valve-retaining lever and rock the same so that the hook is disengaged from the valve and held clear thereof. Thus the valve descends and closes the orifice when the pressure falls below that for which the apparatus is set for closing. It will be understood that due allowance must be made when adjusting the lamps individually to accommodate differences in pressure due to varying distances from the generating station.

Grilling Burners.—No. 199,685.

AIRD, K., of Falkirk.

No. 8310; June 12, 1922.

This invention seeks to obtain a more easy and complete action of the movable grilling burners of a gas-cooker.

The grilling burners are of the usual construction, except that at one end a bearing pin is provided and a stop pin at the side thereof, and on the side of each grilling burner is a pin. A lug depends from the hotplate, through a slot in which passes one end of a specially designed draw-rod, the other end resting in a hole formed in the burner support.

Draw-Rod for Rotating Grill Burners.

The draw-road has an extension arm projecting from the upper part; and the arm is constructed as shown in the part elevation reproduced. Rotation of the burners is effected by the side pins working in this extension. At the end of the rod are two lugs positioned on opposite sides of the support so that the movement of the rod is limited.

Wet Gas-Meters.—No. 199,151.

FOX, T., and ROBINSON, S., both of Liverpool.

No. 8004; March 20, 1922.

This invention relates particularly to the construction of the inlet pipe and the valve of wet gas-meters.

According to the invention the inlet pipe is detachably secured to the meter and also to the inlet valve, which in itself can be easily detached from the float. Further, the enclosing case for the float is detachably secured to the valve itself, and is in no way connected with the casing of the meter. In this way it is possible to take the valve to pieces at any time for cleaning; and the entire inlet valve can be completely assembled together with the valve box, float, and the enclosing

case before being fixed into position. It is then screwed into position on the detachable inlet pipe.

As will be seen from the drawings, a tubular socket adapted to receive the inlet pipe is soldered or otherwise fixed to the meter casing. The inlet pipe itself comprises an upper threaded portion adapted to receive the union for the gas supply pipe, a central threaded portion a the bottom of which is formed a flange, and a lower threaded portion to screw into the inlet valve. This inlet pipe is secured to the tubular socket fixed in the meter casing by being inserted from the inside so that the central flange comes up against a projecting rim on the inner diameter of the tubular socket, and is kept in position by a nut on the central threaded portion passed over the pipe from the upper end. A leather washer is provided to ensure a gas tight joint. To prevent rotation of the inlet pipe, a slot is formed in the flange, which is adapted to engage with a pin in the socket.

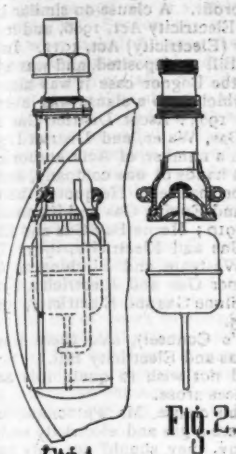


FIG. 1.

FIG. 2.

Wet-Meter Gas Inlet Construction.

The inlet valve comprises a bell-shaped portion threaded at the upper end to receive the bottom portion of the inlet pipe, and provided at the bottom with a screwed cap having a central opening through which passes the valve stem, and a diametrical support for the latter. The float is guided in its movement by means of wire stays fixed to the bell portion of the valve and extending downwards to form a loop.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for July 18.]

Nos. 17,694 to 18,267.

DAVIES, W. E.—"Carbonization or gasification of fuels, &c." No. 18,139.

EVANS, O. B.—"Means for controlling water-gas apparatus." No. 17,768.

GARTLEY, W. H.—See Evans, O. B. No. 17,768.

GAS LIGHT AND COKE COMPANY.—"Automatic control apparatus operating by running water, &c." No. 18,183.

HUMPHREYS AND GLASGOW, LTD.—See Evans, O. B. No. 17,768.

JONES, A. C.—"Globes, shades, &c., for incandescent gas-burners." No. 18,023.

JONES, F. W. SALISBURY.—"Distillation of coal." No. 18,256.

KNIGHT, A.—"Making air or gas tight joints." No. 17,935.

KNIGHT, A.—"Gas-valves for gas-meters." No. 17,936.

LARNER, C. W.—"Flow-control valves." No. 18,129.

MESSENGER & SONS.—See Jones, A. C. No. 18,023.

PHILLIPS, J. M.—See Gas Light and Coke Company. No. 18,183.

ROGERS, R. J.—See Knight, A. Nos. 17,935, 17,936.

STUBBS, S. P.—See Jones, A. C. No. 18,023.

WILKINSON, H.—"Leak indicator and locator for pipes, &c." No. 18,034.

WOOD, E. A.—"Gas lighting apparatus." No. 18,171.

YOUNG, W. H.—See Davies, W. E. No. 18,139.

Fatal Oil Pre-Heater Explosion.

There was issued last week the official report of the preliminary inquiry made by Mr. R. W. Gunston, of the Board of Trade, into the explosion of an oil pre-heater at a colliery bye-products works at Wombwell. The explosion occurred on Oct. 25 at the works of the Mitchell Main Colliery Company, Ltd., and, as a result, Joseph Taylor, a fitter's labourer, was seriously injured, and died on the following day. Harold Adolphus Morfey, Works Manager, was extensively scalded; while Alfred Taylor, fitter, was scalded about the eyes, and Laurence Thickett about the hands and face. The explosion shattered the pre-heater, and shifted another similar pre-heater. The accident was due to the pre-heater being subjected to a greater pressure than it was capable of withstanding. Since the explosion a new pre-heater of similar design has been installed. All cocks have been removed from the oil line, and the two pre-heaters are now permanently in series. The safety valves have been removed from the top covers, and one is now fitted on the pump delivery pipe, where it comes in contact with cold oil, and is not so liable to gum. It is also fitted with a smaller weight than previously, which, when placed at the extreme end of the lever, lets the valve lift at 10 lbs. per sq. in. In this new position it is under the more immediate notice of the still room attendant; and an oil pressure gauge is fitted alongside it. At the conclusion of the report, Mr. Thomas Carlton, Assistant Secretary of the Mercantile Marine Department, makes the following observations: "The circumstances which led up to the explosion were certainly exceptional; but had the relief valve been properly set and in good working order, the heater would have been fully protected against over-pressure from any cause, and the explosion would not have occurred. In view of the comparatively small outlay and trouble involved, it is extraordinary that life and valuable property are continually being endangered by neglect to provide and maintain effective safety valves on vessels subjected to varying pressures."

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Progress of Bills.

Barnsley Corporation Bill: Reported, with amendments.

Birkenhead Corporation Bill: Read the third time, with the amendments. Further amendments made; Bill passed, and returned to the Commons.

Gas Regulation Act.

The Earl of Clarendon moved on the 16th inst. that the Draft Special Orders proposed to be made by the Board of Trade under section 10 of the Gas Regulation Act, on the applications of the Burton-on-Trent Corporation, Milton Regis Urban District Council, Sevenoaks Gas Company, South Suburban Gas Company, Torquay and Paignton Gas Companies, and the Ware Gas Light and Coal and Coke Company be approved; and this was agreed to. A similar motion was made by Viscount Wolmer, and passed.

HOUSE OF COMMONS.

Progress of Bills.

South Staffordshire Mond Gas Bill: As amended, considered; read the third time, and passed, with amendments.

Swanage Gas and Electricity Bill: Reported, with amendments.

Royal Assent.

The following Bills have received the Royal Assent: Hoylake and West Kirby Gas and Water, South Elmsall and District Gas, Oakham Gas and Electricity, Rawmarsh Urban District Council.

Smoke Abatement Bill.

A Bill to amend the law relating to smoke nuisances, and for other purposes, was presented by the Earl of Ossiow last Thursday, and read the first time.

Gas Undertakings and Coal Supplies.

In the course of the debate last Wednesday on the Vote for the Board of Trade,

Mr. HARDIE said he would like to refer to the payment of £200 per annum to one officer as Director of Gas Administration, so as to draw the attention of the Board of Trade to what was happening. When they changed from the system of charging by the cubic foot to that of selling by the therm, they entered not only upon a new method, but upon something that was bound to tell very much against the small gas undertakings. No two seams of coal had the same thermal value. The large undertakings could afford to take the output of one or more mines; and they were always, because of this fact, getting a steady output of coal, and having the choice of the best coal. Since no two coals had the same therm value, it meant that, while the big companies were able to buy the output of one or more mines, the smaller gas undertakings were going to be left with coal that did not contain the same therm value. This meant that the smaller gas undertakings must either increase the price of their gas, or they must continue to lose on the manufacture of it. This was a most serious question; and unless something was done immediately, it would mean that the poorer people in the outlying districts, where carbonization was on a small scale, would be compelled either to pay a quarter more, or perhaps to go without gas altogether. If the Board of Trade desired to put this on a proper basis, all that they had to do was to take an analysis of the coal, and there and then decide on certain classes of coal for gas manufacture. This was the only way to give fair play to those who were manufacturing gas. What was happening to-day? The Board of Trade seemed to riot in a system of anarchy in the coal trade. The very best coal was used to raise steam, which was the lowest use to which one could put coal. They never got a word of guidance or of control from the scientific men who said that this was national waste. He hoped the Board of Trade would move with the times, and keep abreast of science.

BARNSLEY GAS SPECIAL ORDER.

A full report appeared in last week's "JOURNAL" [pp. 313-15] of an inquiry by a Committee of the House of Commons with respect to an Order which the Board of Trade proposed to make for the Barnsley Gas Company under section 10 of the Gas Regulation Act. Objections to the terms of the Order had been raised by two parties, but agreement had been reached in one case—that of the Barnsley Corporation. The other objection was by the London, Midland, and Scottish Railway Company.

The terms of settlement arrived at with the Corporation involved two amendments to the Order. The first, by a clause set out in last week's "JOURNAL," makes the Company a sliding-scale concern; and the second provides that, until the sliding-scale comes into force, the amount the Company may carry to reserve fund shall not exceed 1 p.ct. per annum on the total authorized capital (including loan capital) of the undertaking.

The Railway Company maintained that the Gas Company should not be in a position (as they would have been under the original Order) to supply gas in bulk beyond their limits until they had satisfied the demands within their area. Section 25, authorizing the supply in bulk, has had the following addition made to it by the Committee: "Provided that the Company shall not supply gas under any such contract beyond the limits of supply if and so long as such supply would interfere with the supply of gas within those limits." To meet the objections of the Railway Company, a proviso as follows has also been attached to the clause freeing the Company from obligation to give a

supply of gas for any purpose other than lighting or domestic use when the capacity of the main is insufficient: "Provided that this section shall not apply to any main used by the Company for the supply by them of gas under a contract entered into under section 25 of this Order."

The report of the Select Committee containing the Order, with modifications and additions, as approved, has been printed and published by H.M. Stationery Office, Imperial House, Kingsway, W.C., at the price of 6d. net.

SWANAGE GAS AND ELECTRICITY BILL.

The Unopposed Committee of the House of Commons, presided over by Mr. J. FITZALAN HOPE (Chairman of Ways and Means), ordered this Bill to be reported for third reading on Wednesday, July 18. (The proposals of the Bill were dealt with in the "JOURNAL" for Feb. 14, p. 386, and June 13, p. 682.)

Mr. H. G. PRITCHARD (Messrs. Sharpe, Pritchard, & Co., Parliamentary Agents), after pointing out that the Bill had passed the House of Lords, said that one of its main objects was to enable the Swanage Gas Company to acquire the undertaking of the Swanage Electricity Supply Company, Ltd. The Gas Company had had a somewhat chequered career. Originally it was a gas and water company; but seven or eight years ago the Company sold the water undertaking to the District Council, and had since carried on the gas undertaking themselves. Until recent years it was, he was bound to say, not a success, but within the last eighteen months or two years there had been an entire change in the directorate. The undertaking was now in a fair way to success in every respect. The position of the electricity undertaking was, if anything, rather worse. Indeed, it was so serious that it had been a matter of extreme doubt whether a supply of electricity could be continued throughout last winter; and it was clear that, in the absence of additional works, the supply could not be carried out during next winter. Consequently, some of the Directors of the Gas Company had, in anticipation of obtaining Parliamentary consent to the Bill, found considerable sums of money with which to put up a new generating station (sanctioned by the Electricity Commissioners) on land adjoining the gas-works. There was no opposition to this; and he believed he could say that the Local Authority strongly supported the proposal that the electricity undertaking should be taken over by the Gas Company.

Dealing with reports on the Bill from various Government Departments, Mr. Pritchard said that in the other House there were several; and, for the most part, the recommendations had been disposed of. The Commissioners of Works had reported that they had no observations to offer; but there were other reports—from the Board of Trade, Home Office, and Ministry of Transport. Dealing with the Board of Trade report first, Mr. Pritchard said reference was made to the clause giving a maximum dividend of 8 p.ct. on the new ordinary, and 7 p.ct. on the new preference capital. The Board of Trade had pointed out that the usual maximum rate of dividend on gas capital was 7 p.ct., and had suggested that the Committee should satisfy themselves that a higher rate was necessary in this case. There were many precedents in recent years for 8 p.ct., and even 10 p.ct.; and the reason he asked for 8 p.ct. was that the financial history of the Company was not very satisfactory. Nothing very much turned on it from the point of view of the consumer, because with the higher dividend the Company hoped to be able to issue the capital at a better price. The capital must be issued either under the Auction Clauses or under a clause included in the present Bill (which clause had been inserted in many Acts) giving power to issue it to the public by subscription, with the consent of the Board of Trade.

In reply to the CHAIRMAN, Mr. Pritchard said that the total capital issued by the Company at present was £37,850, which included £2250 debentures.

The CHAIRMAN asked for recent precedents for the dividend of 8 p.ct.

Mr. PRITCHARD gave the following:

1918	Arlesley Gas (original capital referred to in 1901 Act)	10 p.ct.
	Llandrindod Wells Gas Order	10 ,,
1919	Ammanford Gas Act	8 ,,
	Chepstow Water Act	8 ,,
	Pembroke Gas Act	10 ,,
1920	Great Marlow Gas Order	8 ,,
	Taunton Gas Order	8 ,,
	Mid Kent Water Order	8 ,,
	East Kent Water Order	8 ,,
	South Kent Water Order	8 ,,
1921	Harrogate Gas Order	10 ,,
	Salisbury Gas Order	8 ,,
	Dursley Gas Order	8 ,,
	Harpenden Gas Order	8 ,,

There were none last year. The Local Authority raised no objection to this.

The Committee allowed the dividend of 8 p.ct.

Another matter mentioned in the Board of Trade report related to a clause giving the Directors power to determine the remuneration of the Secretary and of the Auditors of the Company. The Board of Trade had suggested that the remuneration of the Auditors should not be included in this clause. The view of the Company was that the Directors knew far better than a general meeting what work the Auditors had to do, and what was suitable remuneration. The clause had been inserted in several cases, including the Windsor Gas Act of last year.

The Committee did not see any advantage in leaving the remuneration of the Auditors in the hands of the Directors. The words "and of the Auditors" were therefore struck out of the clause.

Coming to the Ministry of Transport report, Mr. Pritchard said the Ministry had suggested the insertion of a clause with regard to the electricity undertaking which provided that whenever, in any year, the receipts on the revenue account of the undertaking exceeded the total expenditure (including payments to the special purposes fund) and a sum equal to 7 p.ct. on the aggregate amount of capital employed in the undertaking, the Company should make such a rateable reduction in the charge for electrical energy as in their judgment would reduce the surplus to that maximum rate of profit. A clause on similar lines was inserted in the Brixham Gas and Electricity Act, 1906, and in the Bognor Gas Light and Coke Company (Electricity) Act, 1912. In the Brixham case it was inserted in the Bill as deposited, and was obviously done so by agreement; and in the Bognor case it was also inserted by agreement. Other Acts in which such a clause was inserted were: Andover Lighting and Power, 1905; Ascot District Gas and Electricity, 1906; and the Aldershot Gas, Water, and District Lighting, 1909. Since 1912 there had been a number of Acts authorizing gas and electricity undertakings in the hands of one company, and in none of these cases was such a provision inserted. He quoted the following: Bishop's Stortford, Harlow, and Epping Gas and Electricity, 1910; Farnham Gas and Electricity, 1910; Herne Bay Gas and Electricity, 1913; Crowborough District Gas and Electricity, 1913; Tottenham and Edmonton Gas, 1913; Westgate and Birchington Gas and Electricity, 1913; Deal and Walmer Gas and Electricity, 1914; Hightown Gas and Electricity, 1914; Stone Gas and Electricity, 1914; and Ormskirk Gas and Electricity, 1915.

Sir ERNEST MOON, K.C. (Speaker's Counsel), said there was a precedent this session—the Oakham Gas and Electricity Bill.

Mr. PRITCHARD replied that he did not wish to quote this as a precedent, because peculiar circumstances arose.

Asked what was the exact effect of this clause, Mr. PRITCHARD said that apparently the idea was that, where a gas and electricity undertaking were carried on by one company, they should not only have their dividends limited, but so much of the profits as was derived from gas must not exceed the amount of the maximum dividend, and so much as was derived from electricity must not exceed the amount of the maximum dividend, so that, if they made a loss on one undertaking and a profit on the other, they could not set-off one against the other. They must balance each, so that each portion of the undertaking produced its precise amount of profit for the purposes of dividend. It was contrary to what the Company intended. They wished to carry on the Company as one; and it would be impractible and extremely unfair to impose such an obligation upon them. At present the Swanage Electricity Supply Company had no limit whatever on their dividend; and he could not see why, when they sold their undertaking to the Gas Company, the latter should be limited in this way. After careful search, he had not found any case since 1912 in which such an obligation had been imposed on a company supplying both gas and electricity.

Sir ERNEST MOON asked what had happened at Brixham.

Mr. PRITCHARD said he believed the position was that they had never paid their maximum dividend.

The CHAIRMAN announced that the Committee would not insist on the insertion of the clause.

Another point raised by the Ministry of Transport, said Mr. Pritchard, and also by the Home Office, was with regard to a clause giving the Company power to refuse to supply gas or electrical energy to any person whose payments for the supply of either gas or electricity, or meter rent, were in arrear. The Departments agreed that if a man did not pay his gas bill, the Company should not be under an obligation to supply him with gas, and the same applied in the case of electricity. In this case, however, the Company wished to go further, and to say that if the consumer did not pay his gas bill, then the Company should not be bound to supply him with electricity, or *vice versâ*. He submitted that this was right in principle. The clause had been allowed in other cases. It was allowed in the case of Plymouth in 1915; in Coventry in 1920; and had been allowed by the Local Legislation Committee in the case of the Chesterfield Bill in the present session.

Sir ERNEST MOON said he had an objection to this clause. Its effect was that, supposing a gas consumer had a *bona fide* dispute with the Company as to whether his Bill was payable by him or not, and he was also a consumer of electricity, the Company could refuse to supply him with electricity unless he paid his gas bill. Then the consumer, if he paid his gas bill and wished to recover the money, had to bring an action in the County Court in order to get it back.

Mr. PRITCHARD said the Committee would appreciate that, if there were a *bona fide* dispute, the Company were not likely to put this power into operation, because they would be running a risk. If they cut off the supply of gas or electricity without the right to do so, they became liable to severe penalties.

After deliberation, the Committee disallowed the clause.

Another point raised in the Home Office report referred to a clause providing that notice from a consumer to discontinue the supply of electricity should not be of any effect unless it were in writing. It was pointed out by the Home Office that this did not allow notice to be given by word of mouth; but Mr. Pritchard said it was obviously in the interests of everybody, particularly the consumer, that this notice should be given in writing. The Committee left the clause as it was.

Col. H. W. WOODALL proved the preamble of the Bill.

A SMOKE ABATEMENT BILL.

A Bill to amend the law relating to Smoke Nuisances, and for other purposes connected therewith, has been introduced in the House of Lords by the Earl of Onslow, and ordered to be printed.

Among other things, the Bill provides for the amendment in certain respects of the parts of the Public Health Act, 1875, and the Public Health (London) Act, 1891, relating to smoke nuisances. For the purposes of the Acts, a chimney (not being the chimney of a private dwelling-house) sending forth smoke in such quantity as to be a nuisance, shall be deemed to be a nuisance liable to be dealt with summarily in manner provided by the Acts, notwithstanding that the smoke is not black smoke; the expression "smoke" shall include soot, ash, grit, and gritty particles; where the complaint upon which a summons is issued relates to a smoke nuisance, £50 shall be substi-

tuted as the maximum penalty; and where a nuisance order relates to a smoke nuisance, 40s. and £5 were substituted. In the latter Act, in sections relating to penalties for non-consumption of their own smoke by furnaces and steam vessels, £25 and £50 shall be substituted for £5 and £10. Section 334 of the former Act shall have effect as if there were included among the processes specified the processes of reheating and annealing, hardening, forging, converting, and carburizing iron and other metals—provided that the Minister may, by Provisional Order, at any time after the expiration of five years from the passing of this Act, exclude from the application of that section any processes specified (as amended) so far as smoke nuisances are concerned.

In any proceedings for sending forth smoke from a chimney in such a quantity as to be a nuisance, it shall be a defence for the person charged to show that he has used the best practicable means for preventing the nuisance, having regard to the cost and to local conditions and circumstances.

The Minister of Health may, after a public inquiry and after consultation with any local authorities or other interests concerned, make orders extending the list of noxious or offensive gases mentioned in section 27 of the Alkali, &c., Works Regulation Act, 1906, and extending the list of works mentioned in the First Schedule of that Act.

Powers of authorities shall extend to the making of bye-laws requiring the provision in new buildings other than private dwelling-houses of such arrangements for heating as are calculated to prevent or reduce the emission of smoke.

The Act shall not apply to Scotland or Northern Ireland.

BARNSLEY CORPORATION BILL.

This Bill [see "JOURNAL" for Feb. 14, p. 385, and May 16, p. 437] was ordered by the Unopposed Committee of the House of Lords, presided over by the Earl of DONOUGHMORE (Chairman of Committees) on Wednesday of last week, to await report. A petition had been deposited against the Bill by the Barnsley Gas Company, who objected to the Corporation acquiring a small part of the gas-works site for building a railway siding for the benefit of their electricity works. This petition was subsequently withdrawn; and a clause has been inserted in the Bill providing that the Corporation shall not, except by agreement, enter upon, take, or use any lands of the Gas Company.

TORQUAY CORPORATION BILL.

This Bill [see "JOURNAL" for Feb. 14, p. 386, and June 20, p. 748] was ordered to await report by the Unopposed Committee of the House of Lords on Wednesday, July 18. There were no amendments to the gas clauses.

LEGAL INTELLIGENCE.

Brotherton and Co., Ltd., *v.* Glasgow Corporation.

In the Edinburgh Court of Session, last Thursday, an appeal by the plaintiffs was heard in this action. In October, 1904, the plaintiffs entered into a contract with the defendants whereby they acquired from them right to certain chemical works, buildings, and ground appertaining to the gas-works at Provan, and also to the tar and ammoniacal liquor produced by the defendants. The duration of the contract was for five years, but on its expiry a new contract for a further period of five years was entered into. A third contract was for an indefinite period. The contract was finally terminated on July 31, 1920, by the defendants, who took over the works, and had since carried them on. The parties were at issue as to the construction of an article of the contract which dealt with the price to be paid by the plaintiffs for the tar and ammoniacal liquor supplied to them by the defendants under the contract. In the Outer House, Lord Blackburn gave judgment for the defendants, holding that the plaintiffs' construction of the article was erroneous. The Court recalled the interlocutor of the Lord Ordinary, and allowed parties a proof. The Lord President said he was not prepared to accept the construction which the Lord Ordinary had given to the article. There was more than one possible construction open; and in all probability the choice of which ought to be selected as the true one, might be very greatly affected by the way parties had conducted themselves in relation to the contracts up to 1916. There was apparently no prospect of agreement as to the facts; and he saw no alternative but to send the case back to the Lord Ordinary, in order that the parties might have an opportunity of clearing-up these matters.

Lochgelly Gas Company, Ltd.—The balance-sheet which was unanimously adopted at the annual general meeting of the Company showed a net profit of £2208. A dividend at the rate of 7½ p.ct., free of tax, was declared. The production of 50 million c.ft. of gas was an increase of nearly 4 million c.ft. over the previous year.

Fife Gas Company's Profit.—An unsatisfactory state of affairs was reported at the monthly meeting of the Buckhaven and Leven Joint Gas Commission. It was stated that last year's operations had resulted in a profit of £6229, which cleared off practically the deficit of the same amount carried forward from the previous year. The Treasurer (Mr. W. T. Nisbet) pointed out that in consequence of this profit having been earned, the undertaking this year would have to pay £2300 income-tax, and £1600 more in rates, the latter being due to the increased valuation of the works at Leven and East Wemyss. It was remitted to the Manager and the Treasurer to draw-up a report for the next meeting which would help the Commission to decide upon a course which would enable them to make a large reduction in the price of gas.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Porthcawl Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 6d. per therm.

It is also proposed that an additional charge of 3d. per therm should be authorized in respect of gas supplied through a prepayment meter, in respect of hire of meter and fittings.

Rainford Gas Company, Ltd.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 17·6d. per therm.

It is also proposed that additional charges should be authorized in respect of gas supplied through a prepayment meter—namely, for meter only 1·4d. per therm, for meter with fittings 2·8d. per therm, and for meter with fittings and cooker 4·2d. per therm.

Stretford and District Gas Board.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 13d. per therm.

SPECIAL ORDER.

Wolverhampton Gas Company.

Application is to be made by the Company to the Board of Trade for a Special Order under section 10 to authorize the purchase of certain lands for gas-works purposes and the issue of further capital; to make provisions as to dividend, the holding of annual meetings, the supply of gas in bulk; and for other purposes.

DECLARATIONS OF CALORIFIC POWER.

Loughborough Corporation.—450 B.Th.U. (Aug. 1.)
Silsden Urban District Council.—450 B.Th.U. (Sept. 1.)

GAS REGULATION ACT ORDERS.

There have been forwarded by the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Batley Corporation.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 17d. per therm. (July 17.)

Doncaster Corporation.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 12·6d. per therm.

Prepayment meter clauses are included. (July 17.)

Hebden Bridge and Mytholmroyd Gas Board.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 15·6d. per therm.

After the declared date, the word "therm" shall be substituted for "1000 c.ft." in section 63 (Board to supply gas to Cragg Vale) of the Hebden Bridge and Mytholmroyd Gas Board Act, 1895. (July 17.)

Maryport Urban District Council.

After the declared date, the maximum prices in respect of gas supplied by the undertakers shall be 13·6d. per therm. (July 18.)

Melton Mowbray Gas Light and Coke Company, Ltd.

After the declared date: (i.) The standard price in respect of gas supplied by the undertakers shall be 13·8d. per therm; (ii.) "2d. per therm" shall be substituted for "10d. per 1000 c.ft." in sub-section (2) of section 8 (price of gas—sliding-scale) of the Melton Mowbray Gas Order, 1915.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five-and-one-fifth. (July 16.)

Mountain Ash Urban District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 15·6d. per therm.

Prepayment meter clauses are included. (July 17.)

Rate Relief at Clitheroe.—Alderman Whiteside, in proposing to the Clitheroe Town Council the transfer of £1000 for the gas suspense account to the district fund in relief of rates, said the gross profit of the Gas Department for the year was £7064, out of which £2217 had been paid in capital charges, leaving a balance of £4847. Some might urge that the profit should have been applied for the benefit of consumers. Though there had been an increase of nearly 2¼ million c.ft. in the sale of gas, the Corporation had received £2783 less for it, and £2655 less for coke, due to the substantial reductions at which these commodities were sold. The success that had been achieved had been largely owing to the good buying of coal, for which they had paid £7773 less than in the previous year. Next year, however, their coal bill would amount to something like 2s. per ton more; and with the reduction of 6d. per 1000 c.ft. in gas, there would be no reason to complain about a large profit. The suspense account was opened during the war period, and could now be dispensed with.

STOKE-ON-TRENT GAS DEPARTMENT WORKING RESULTS.

For the Year ended March 31.

There is included in the accounts of the Gas Department of the County Borough of Stoke-on-Trent, for the year ended March 31 last, the following table of general results prepared by Mr. A. Mackay, Chief Engineer and Manager.

—	Burslem.	Hanley.	Stoke.	Fenton.	Longton.
	Cubic Feet.	Cubic Feet.	Cubic Feet.	Cubic Feet.	Cubic Feet.
Coal gas made	247,141,000	346,023,000	164,779,700	149,374,000	177,899,000
Water gas made	..	88,121,000	..	..	19,731,000
	247,141,000	434,144,000	164,779,700	149,374,000	197,630,000
Gas sold—					
Ordinary meters	107,704,800	220,791,600	56,051,500	62,100,700	75,488,600
Automatic meters	101,146,900	136,900,900	79,368,300	66,860,200	92,217,900
Public lighting	11,985,100	17,943,000	12,308,200	6,115,700	9,429,900
Gas used on works, &c.	2,446,600	5,207,600	1,226,000	1,042,400	1,590,500
Gas unaccounted-for	23,857,600	53,300,900	15,825,700	13,255,000	18,903,100
	247,141,000	434,144,000	164,779,700	149,374,000	197,630,000
Increase of gas sold over previous year	..	..	4,651,600	733,800	4,239,600
Increase of gas sold—p.ct.	..	..	3·25	0·54	2·45
Decrease of gas sold under previous year	3,245,300	19,689,652	..	..	..
Decrease of gas sold—p.ct.	1·44	5·24	..	..	..
Coal carbonized (tons)	18,235	25,407	11,878	10,660	11,799
Gas made per ton (c.ft.)	13,553	13,619	13,873	14,012	15,077
Gas sold per ton (c.ft.)	12,100	11,784	12,437	12,671	13,571
Gas unaccounted-for, p.ct. on make	9·65	12·27	9·60	8 88	9·56
Coke saleable per ton of coal carbonized (cwt.)	10·43	10·14	11·66	10·23	12·28
Tar made in gallons per ton of coal carbonized	13·07	9·87	11·05	11·75	11·16
Sulphate made per ton of coal, in lbs.	24·26	25·54	..	..	27·91

METROPOLITAN GAS COMPANIES' OFFICIAL TESTINGS.

The reports of the Gas Referees of the official testings for the past quarter under the provisions of the Gas Regulation Act give the following average calorific values for the gas supplied by the Metropolitan Companies named.

Brentford Gas Company.—468·7 B.Th.U. (declared calorific value, 460 B.Th.U.).

Commercial Gas Company.—484·1 B.Th.U. (declared calorific value, 475 B.Th.U.).

Gas Light and Coke Company.—501·4 B.Th.U. (declared calorific value, 500 B.Th.U.).

South Metropolitan Gas Company.—565·2 B.Th.U. (declared calorific value, 560 B.Th.U.).

South Suburban Gas Company.—477·8 B.Th.U. (declared calorific value, 460 B.Th.U.).

Wandsworth, Wimbledon, and Epsom District Gas Company.—474·6 B.Th.U. (declared calorific value, 470 B.Th.U.).

HEYWOOD GAS DEPARTMENT.

Annual Report.

Reporting to the Borough of Heywood Gas Committee on the working of the undertaking during the twelve months ended March 31, Mr. W. Whatmough (the Gas Engineer and Manager) says that it resulted in a gross profit of £10,684, an increase of £5536 over the previous year; the net profit being £2994, which compares with a net loss of £2439 for the preceding year. The price of gas having been reduced 6d. per 1000 c.ft., the receipts under this head show a decrease, as do also those for residuals. There has been, however, a saving of expenditure of £8967; while the total falling-off in receipts is only £3430. The Committee have already decided to further reduce the price of gas 3d. per 1000 c.ft., making a total reduction of 9d. during the last twelve months. The charge is now 73 p.ct. above pre-war, compared with 104 p.ct. more paid for coal.

The total quantity of gas manufactured during the past year was 137,583,000 c.ft., a decrease of 1,157,000 c.ft.; the quantity sold, as registered by consumers' meters, being 124,321,869 c.ft., or a decrease of 35,051 c.ft. At 7·82 p.ct., the unaccounted-for gas shows a reduction of 0·8 p.ct. The total consumption is still over 10 million c.ft. less than pre-war; bad trade and electrical competition being the principal causes of the large decrease.

BRITISH CYANIDES COMPANY, LTD.

The Fixation of Atmospheric Nitrogen.

In his address to the shareholders at the annual general meeting of the Company, Mr. C. F. Rowsell (the Chairman) said the net profit for the past year was £17,204, as against £2383; and this was almost entirely earned in the latter months of the period. With regard to their investment in the Oldbury Syndicate, he pointed out that this had increased from £56,918 to £69,042. The operations of the Syndicate in connection with the development of the barium process for the extraction of nitrogen from the air had been on a considerable scale. The Directors had decided that, in the absence of anything abnormal, they would declare in the early autumn an interim dividend of 5 p.ct. on account of the profits of the current year. He moved the adoption of the report and accounts.

Sir Arthur Duckham, K.C.B. (Deputy-Chairman), seconded the motion.

Mr. Kenneth M. Chance (Managing-Director) said he had to make an important announcement as to the success which they had achieved with regard to the fixation of atmospheric nitrogen. It had been obvious for many months past that they were rapidly approaching the stage at which they could obtain from the nitrogen of the atmosphere raw material in unlimited quantities for the cyanogen products which the Company manufactured; and the Directors had that day given instructions for estimates to be prepared for a plant for this purpose. A Board meeting had been summoned to consider such estimates, and to decide upon the number of unit plants to be erected at once. The plant for this stage of the process was not a costly one, nor would it take long to erect; and he hoped that within a few months' time they would be supplying the markets of the world with a part of their requirements of those cyanogen products for which the reputation of the Company was established, manufactured from nitrogen of the atmosphere. Throughout the history of the Company their work had been hampered through lack of raw material, of which their factories could handle large quantities; but as they got the new process going, raw material would be available at low cost and in any quantity for which they might decide to lay-down additional units as opportunity arose.

The report and accounts were adopted.

JOHNSTONE GAS-WORKS RESULTS.

In his report to the Town Council of Johnstone on the working of the gas undertaking during the financial year ended May 15, Mr. James Dickson (the Engineer and Manager) says the total quantity of gas made was 115,047,000 c.ft.; the quantity unaccounted for being equal to 8·4 p.ct. of the gas made. The number of consumers considerably increased. The greatest obstacle to the highest efficiency in lighting results now remains in the inadequate piping of tenement houses; and it may be that the complete remedy will not be found until legislation provides the gas undertaking with larger powers in this respect.

An analysis of the accounts for the year reveals several outstanding features. The coal used amounted to 6856 tons, against 6646 tons in the previous year; the gas made per ton, to 16,780 c.ft., compared with 17,108 c.ft.; while the average cost of coal worked out at 19s. 9·30d. per ton, against 32s. 2·83d. per ton delivered. The handsome returns derived from the sale of residual products are without precedent in the history of the undertaking. The gross expenditure on coal amounted to £6779; and after deducting all costs of handling and working up coke, tar, and sulphate of ammonia, the net revenue from this latter source amounted to £7919, equal to 23s. 1·18d. per ton of coal, so that the gain on coal handled was £1139, or 3s. 3·87d. per ton. The gross cost of gas into the holders, inclusive of coal, purifying, salaries of the Engineer and office staff, wages of stokers and labourers, and the maintenance of works and manufacturing plant, amounted to £12,845, equivalent to 2s. 2·79d. per 1000 c.ft. made, and 2s. 5·24d. per 1000 c.ft. sold; and after deducting £7918 received for residuals (less cost of working), the net cost into the holders amounted to £4927—10·27d. per 1000 c.ft. made, and 11·22d. per 1000 c.ft. sold.

The working of the residual products plant, as the figures given above denote, has been of an exceptionally successful nature, due, states Mr. Dickson, to favourable marketing conditions, and also in a measure to the broad lines of policy adopted in having adequate and up-to-date plant capable of treating not only their own crude product, but that of others not similarly circumstanced. The tar produced by the undertaking amounted to 123,600 gallons, equivalent to 18·02

gallons per ton of coal carbonized; and the quantity brought in from other sources and treated during the year was considerably greater than in any previous year dating from the installation of the tar distillation plant. The sulphate of ammonia produced was 128 tons 14 cwt., equal to 42·05 lbs. per ton of coal carbonized. The average gross price received during the year was £15 1s. 2d. per ton; and the cost of working was £5 13s. 6d per ton inclusive of acid, labour, carriage, bags, and maintenance. The coke produced for sale was 1947 tons, equal to 5·67 cwt. per ton of coal carbonized; and the average price realized was 22s. 4·10d. per ton.

There is a gross balance at the credit of revenue account of £9225; and after payment of capital charges, the sum at credit of net revenue account is £3490. After wiping off the debit balance of £2770 on tis account at May 15, 1922, there remains a balance of £719 to be carried forward.

The year commenced with a reduction of 10d. per 1000 c.ft. in the price of gas, bringing it to 4s.; and in October, 1922, a further readjustment made it 3s. 6½d. The present selling price is 3s. 1½d.; and the prospects of a further reduction in October are bright, but cannot be estimated until present coal contracts have expired and the new prices are available.

The plant has been adequately maintained out of revenue; and the vertical retort installation continues to give most satisfactory working results. This plant has now entered on its eleventh year of service, and is generally in better condition and giving more efficient service than it was giving a decade ago.

IRONMONGERS' ASSOCIATION AT LUTON.

Visit to the Davis Gas-Stove Company's Works.

The Diamond Foundry, Luton, was the scene of an interesting gathering on the 4th inst., when the London and Home Counties Ironmongers' Association, for the first time in ten years, visited the Davis Gas-Stove Company's works. The party of about 130 ladies and gentlemen were received by the Managing-Director, Mr. H. N. Davis, in the spacious social club room. In parties of ten they were then looked after by Messrs. H. N. Davis, F. Blackwell, J. G. Johnson, W. Walker, J. Ure, P. Murdoch, R. Shadbolt, H. Clift, J. Morrison, W. Eling, and Misses Bloomfield and Cullen.

The members of the Association were much interested in the processes of manufacture of gas appliances of all kinds, and were particularly impressed by the expeditious manner in which, through progressive stages, the finished product was evolved from the raw material. The shape of the Diamond Foundry resembles that of an enormous horseshoe lying on a site of 16 acres. With raw material entering a siding at one end of the horseshoe, and the finished product emerging at the other end, it is clear that the arrangement is not only an exceedingly convenient one, and economical of space, time, and labour, but it is also one that makes it easy for the visitor intelligently to follow the progressive stages of manufacture. Judging by the activity to be seen on all hands at the Diamond Foundry, the Davis Gas-Stove Company are little affected by the trade depression of the present time. Indeed, throughout the last two years they have kept going a full complement of their staff. Many of the party were among those who visited the Diamond Foundry ten years ago: and they in particular were impressed by the many extensions and alterations that have been made in the interval. The visitors were intensely interested in the "Alpine" high-efficiency gas-range, finished externally to resemble white glazed tiles, and equipped with Davis "Efficiency" boiling burners.

The tour lasted nearly two hours, and then the party adjourned for luncheon, served by the Davis Company's own catering organization. After lunch, the President of the Association (Mr. H. Gregg) expressed appreciation, on behalf of the visitors, of the opportunity they had had of inspecting the works, and their thanks to Mr. H. N. Davis and his colleagues for the hospitality extended to the Association, to the gentlemen who had shown them round, and to the staff and workmen. Mr. Gregg remarked upon their good fortune in being received into one of the most modern and best-arranged works in the country. [Applause.] One of the many things they had learned from their visit was the value placed upon goodwill and friendship in the works. He instanced the well-known provision made there for recreation. The Sports Club, he thought, was run in the best possible way. The employees had to pay for their sport, and so realize the value of money. Mr. Davis decided at the beginning of a year what was a fair proportion for the firm to give the Club towards its activities; and the members had to provide what they wanted over and above this.

In reply, Mr. H. N. Davis declared that the Company were proud of their works, proud of their staff, and proud of the whole of their undertaking. The Club, he said, was as successful as he thought the works were; and the secret of it was that the Club was run, not by the firm in gifts to the men, but on business lines by a Committee appointed by the employees. This Committee had learned a good deal about management and finance, because they had had to "cut their coat according to their cloth." While the club had been successful financially, it had been much more successful in the splendid spirit it created among the employees. The Company had a loyal staff, and there was a feeling of goodwill among them that would be an example to many other industrial organizations in the country.

Montrose Gas Company's Profits.—The Directors of the Montrose Gas Company, Ltd., in their report for the year ended June 30, state that, after deducting interest on debentures and depreciations, and writing-off £2060 against the vertical retorts, the accounts show a profit for the year of £2857, which, with £303 brought forward, leaves at credit of profit and loss account £3160. From this the Directors propose to carry £700 to the reserve fund (bringing it up to £2500). They also recommend a dividend at the rate of 8½ p.ct., less income-tax, which will require £1968, leaving, subject to Directors' remuneration, £492 to be carried forward.

WARATAH GAS UNDERTAKING LEASED.

The 1922 report of the Local Government Department of the New South Wales Legislature states that the Waratah Municipal Gas-Works were established in 1888, and were originally designed for a capacity of from 5 to 10 million c.ft. of gas annually. The works and mains have been added to very considerably from time to time. The undertaking, however, has always suffered from the inadequacy of its original plan, in view of the rapid development of the district; while owing to the difficulties experienced by municipalities in financing rapidly-expanding trading undertakings, many of the extensions and additions which have taken place have been sufficient only for the immediate needs, and have left little margin for future requirements. The gas supply of Waratah has for some time given rise to complaints, both on account of lack of pressure and defective quality.

For several years past the Council have been faced with the alternative of finding a large amount of capital for new mains and extensions, &c., or of disposing of the whole undertaking; and owing to the rapid progress of the Municipality, the position recently became very acute. After careful consideration, the Council decided that the best course would be to sell the works to the Newcastle Gas and Coke Company, Ltd., and to allow the Company to extend their supply to the Municipality. They accordingly entered into an agreement with the Company for the sale of the undertaking, and approached the Department in order to obtain Legislative authority to cover the proposed sale. In the event of such authority not being granted, the agreement provided for the Council leasing the works to the Company. The Department received legal advice to the effect that the Council could sell neither the land on which the gas-works stand nor the buildings thereon, because they were not the owners of the fee-simple of the land, but only trustees under the Crown Lands Act. The Department of Lands were approached with respect to the proposed sale, and declared their willingness to revoke the dedication and grant of the land, and to make the land available for a special lease to the Newcastle Gas and Coke Company, waiving all claim to the value of the improvements.

The Council, when informed of the position, stated that they did not want to lose control of the site of the gas-works, and therefore decided to lease the site and buildings to the Gas Company for three years from May, 1922, with option of renewal for a further period of twelve months. The Council submitted an application for the approval of the Governor to enter into such a lease, and this was duly agreed to.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 23.

Very large quantities of tar continue to be sent out for road work, and consequently but little pitch is being produced. It would therefore appear as though stocks will be quite nominal when the shipping season commences. The price of pitch is firm at not less than 150s. per ton net f.o.b. makers' works. Creosote remains steady, and there is slightly more inquiry. Its value is 10d. to 10½d. per gallon net in bulk at makers' works. The price of benzole has been affected by the recent reduction in the price of motor spirit; but other spirits in the London market remain unchanged. Pyridine continues in good demand, the price being from 18s. to 20s. per gallon net. There is at present a fair demand for low-grade anthracene for shipment to America; but the price offered is not profitable to the producer.

Tar Products in the Provinces.

July 23.

The average values for gas-works products during last week were: Gas-works coal tar, 84s. 9d. to 89s. 9d. Pitch, East Coast, 140s. to 145s. f.o.b. West Coast—Manchester, 137s. 6d. to 142s. 6d.; Liverpool, 138s. 6d. to 143s. 6d.; Clyde, 138s. 6d. to 143s. 6d. Benzole 90 p.ct., North, 1s. 2½d. to 1s. 3½d.; crude 65 p.ct. at 120° C., 10d. to 10½d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 7d. to 1s. 7½d. Toluole, naked, North, 1s. 7d. to 1s. 8d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d Solvent naphtha, naked, North, 1s. 3½d. to 1s. 5d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 8d. to 8½d.; salty, 7½d. to 8d.; Scotland, 6½d. to 7½d. Heavy oils, in bulk, North, 8½d. to 9d. Carbolic acid, 60 p.ct., 3s. 4d. to 3s. 5d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Fire at the Neepsend Gas-Works.—Fire broke out in the stores department at the Neepsend works of the Sheffield Gas Company last Saturday afternoon. It is surmised that a fan became over-heated. Fortunately the outbreak was soon overcome, and the damage is estimated at not more than £200.

Gas-Works Profit at Selby.—The accounts for the past year of the Selby Urban District Council Gas-Works show a net profit of £2154. When they were submitted to the Council, it was decided, on the motion of Mr. Mark Scott, to acknowledge the services of Mr. T. H. Alderson, the Manager. In response, Mr. Alderson referred to the loyalty and co-operation of the staff and employees, without whose help the past year's results could not have been attained.

Further Reduction at Walton-on-Thames.—Notice is given by the Walton-on-Thames and Weybridge Gas Company that the price of gas supplied by ordinary meter to private consumers is to be further reduced from 1s. 3d. to 1s. 2d. per therm from the reading of the meter indices for the Midsummer quarter. This reduction is equal to 4½d. per 1000 c.ft. In the case of prepayment meter consumers, a cash rebate of 1d. per therm will be made after the completion of the mid-summer collections.

THE NORTH-EAST COAST COAL TRADE.

From Our Own Correspondent.

The market weakness has continued throughout the past week, and at present there is no sign of any improvement.

The strike of dockers at various ports, and specially in London, has again been responsible for delay in the arrival of tonnage; and, in some cases, collieries have been hard put to it to keep their pits working. Merchants who have coal bought and sold to Continental consumers are finding considerable difficulty in persuading the latter to take out their regular quantities. In the present state of the exchanges, they are generally anxious to postpone delivery, except when their needs are urgent; and in these cases they can often buy coal from second-hand holders on the market at lower rates than those prevailing in their own contracts, which were made on the higher market.

At present, therefore, there appears little prospect of any improvement. Collieries are mostly well enough sold for the rest of the year to risk holding their available balances, and they are not lowering their quotations to any great extent. For the remainder of July, and perhaps August, specials and best gas would in most cases probably have parcels to sell at a reduction on the ordinary quotation of 28s. to 29s.—they might take 27s. 6d., or even less, according to individual circumstances. There are second-hand holders who would almost certainly take a lower price even than this. For forward they are not so willing to make reductions at present. A transaction is recorded in a good second class gas up to January or February next year at about 26s. 6d. f.o.b.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

During the past week there has been the usual demand in Yorkshire and Lancashire for gas coal under contract; and fixtures are reported at prices ranging from 20s. to 21s. per ton at the pit for the best screened fuels.

There is no improvement in the domestic trade, owing to the warmer weather. Collieries report as a general rule full orders for the best qualities, though several are prepared to offer slightly reduced figures for stocking purposes. Secondary descriptions are moving slowly, and are not in very keen demand.

There appears to be no improvement in the industrial consuming centres; and though prices remain about the same, this is probably accounted for by the fact that the smaller collieries are now working in some cases four days per week.

The export section is freer than last week, and inquiries are forthcoming from the Scandinavian countries and from Germany, but at figures below those previously mentioned. The chief demand is for gas and furnace coke, though washed nuts are also in request.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

There has been a marked falling-off in consumptive demand. Some of the collieries in this district are playing two days a week. Values have not undergone any general reduction. Since June there has been some readjustment in household coals. It applies chiefly to the better grades, however. Its extent is difficult to gauge, but is of no great significance. Managements that find themselves overloaded with particular grades are inviting offers for odd lots lying at the pit-mouth, and this has a depreciatory effect. At the same time, buying for stock has been a more prominent feature of the market. Inducements held out to merchants to put coal on their wharves are successful within limits, and the domestic consumer is showing more interest in providing for future requirements. Slacks are fairly steady. Some of the gas engineers are still procrastinating with regard to their new contracts on the strength of stocks in hand. They are a small minority, however.

Blast-furnace owners are anxiously watching the course of coke. While collieries are reserving supplies for the pig-iron industry at home, there is considerable disparity in the prices they quote.

Price Reduced at Uxbridge.—The Directors of the Uxbridge, Wycombe, and District Gas Company announce an interim dividend, payable on Sept. 1, at the rate of 6½ p.ct. per annum. They also announce a further reduction in the price of gas of 0·5d. per therm in the Uxbridge and Eton districts, and of 0·7d. per therm in the High Wycombe and Marlow districts, as from the meter readings at Michaelmas next.

Primitiva Gas Company of Buenos Aires, Ltd.—At the annual general meeting next Tuesday (the 31st inst.), the Directors will report a profit on the working for the year ended Dec. 31 amounting to £5108. Deducting this from the debit balance of profit and loss account, leaves a debit at Dec. 31 of £456,600. Capital expenditure was necessarily kept to a minimum; the amount spent during the year being £9405. There were at the close of the year 1140 miles of mains. The General Manager certifies that the works have been maintained in efficient order out of revenue. It has not been possible to make any provision for retiro amortization. Notwithstanding the efforts of the Board, the agreement under clause 5 of the contract with the Municipality for the fixing of the capital of the Company has not yet been arrived at; and until the sum has been agreed, no provision can be made for amortization in terms of the contract. The Chairman went out to Buenos Aires, and there caused a thorough investigation of the Company's affairs to be made. Certain changes in the administration are necessary, and are now in course of execution. The Board have no doubt that these changes are advisable, and have confidence that the Company have now turned the corner, and that better results may be hoped for in the future.

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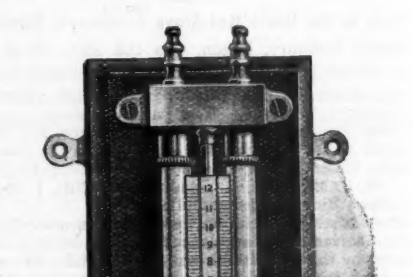

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STOCK MARKET REPORT.

LAST week on the Stock Exchange was interesting, but decidedly unpopular with many. At the start a few gilt-edged showed strength; but others of lesser rank lacked support. Tuesday opened fairly, but gradually fell away weak and inactive. Home Governments were variable; but Indians were steady. Home Rails got no support. Wednesday was very quiet—no enterprise either to buy or to sell. Gilt-edged looked up a bit, encouraged by cheap money. The Foreign Market was cheered by firmness of French. On Thursday there was more backbone in markets, especially the high-class. Friday improved upon this. Home Governments were in good case. The big four marked thus: Consols 58⅝-59½, War Loan 100⅝-100 15/16, Funding 90½-91½, Victory 90-92½. Home Rails were in better favour.

Business in the Gas Market was very quiet and uninteresting; the volume of transactions showing a considerable falling-off, and the plenteous advances in quotation showing more moderation in degree. On the eve of the August holiday a partial shut-down is only to be expected.

The following transactions in gas during the week were recorded: On Monday, Brentford "A" 103¾, European 7⅛, 7¼, Gas Light ordinary 99½, 99½, 99⅝, 99¾, Imperial Continental 160, 160½, Montevideo 51, Primitiva 5 p.ct. preference 35s., South Metropolitan 3 p.ct. debenture 61½, 62½, South Suburban 103¾, Danish 4 p.ct. debenture 81½. On Tuesday, Croydon sliding-scale 105, Gas Light ordinary 99, 99⅛, 99½, 99⅝, ditto 3½ p.ct. maximum 67, ditto 4 p.ct. preference 80½, 81, ditto 3 p.ct. debenture 63. Montevideo 53, Primitiva 6s., San Paulo 6 p.ct. preference 5⅞, South Metropolitan 99, Swansea 6½ p.ct. debenture 105, Tottenham 6 p.ct. mortgage 100. On Wednesday, Continental Union 7 p.ct. preference 74, Gas Light ordinary 94⅞, 95⅛, 95½, 96, 97, Imperial Continental 159, 160¾, 161, Liverpool 5 p.ct. ordinary 90, Montevideo 51, Primitiva 6s., South Metropolitan 98¼, 99, ditto 6½ p.ct. debenture 106½, Tottenham "A" 125, 125½, ditto "B" 104½, ditto 6 p.ct. mortgages 99½. On Thursday, Alliance and Dublin 73⅜, Brentford "B" 102, Croydon maximum dividend 85, 86, European 7⅛, Gas Light ordinary, 97, 97⅛, 98, 98⅛, 98⅜, 99, ditto 4 p.ct. preference 80¾, 82¼, ditto 3 p.ct. debenture 62, Imperial Continental 161, Primitiva 5 p.ct. preference 34s. 6d., 35s., Sheffield "C" 105½, South Metropolitan 99, Tottenham "B" 103, 104, 104½. On Friday, Bombay 5½, Commercial 4 p.ct. 97½, ditto 3½ p.ct. 97½, Europeans 7 15/16, 8⅛, Gas Light ordinary 97½, 98, ditto 3½ p.ct. maximum 66, 67, 67½, ditto 10 p.ct. Bonds 190, Imperial Continental 159½, 160½, ditto 3½ p.ct. debenture 77, Liverpool 90⅜, Primitiva 5 p.ct. preference 35s. 6d., River Plate 4 p.ct. debenture 57½, 58, South Metropolitan 98½, 98½, 98⅝, 99, South Suburban 103¾, ditto 5 p.ct. debenture 96, Southampton 89½, Wandsworth Wimbledon 111, Harrow and Stanmore 5 p.ct. 102½, 102¾, South Suburban 7 p.ct. debenture 104½.

In the Money Market, the condition of pronounced ease which characterized the previous week was wholly eclipsed last week, when the volume of supplies demanding employment on almost any terms in reason amounted to something almost unprecedented according to general estimates. In some quarters a not impossible advance in the Bank rate to 5 p.ct. is being talked about; but it is not regarded as a probability. The discount market was not overburdened with activity, and rates fluctuated. Silver was firmer, influenced by Indian buying orders. The Bank of England rate is 4 p.ct., as fixed on July 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
131,978	Stk.	Feb. 22	—	5%	Aldershot 5 p.c. max. C.	..	74—79	...
190,492	,,	,,	4	4%	Do. 4 p.c. Pref.	..	72—77	...
1,551,868	,,	Apl. 5	2½	5%	Alliance & Dublin Ord.	59—64	72—77	73⅜
374,000	,,	July 12	4	4%	Do. 4 p.c. Deb.	76—79	62—67*	...
280,000	5	May 17	7½	4/-	Bombay, Ltd.	5⅛—6⅛	5—5⅛	5⅛
100,000	5	Feb. 22	16	8/-	Bournemouth Gas and Water { ord. p.c.	..	12—13	...
583,110	10	,,	7	7/-	{ B 7 p.c.	13—15½	12—13	...
115,000	10	,,	6	6/-	{ Pref. 6 p.c.	13½—14	10½—11½	...
162,065	—	June 28	—	4%	{ 4 p.c. Deb.	..	77—82	...
992,045	Stk.	July 12	14	6¼/-	Brentford A Consolid.	261—266	100—105*	103½
734,920	,,	,,	11	6¼/3	Do. B New	204—209	100—101*	102
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	83—88*	...
221,400	,,	June 14	4	4%	Do. 4 p.c. Deb.	91—93	77—82	...
214,775	,,	Mar. 8	11	11¼%	Brighton & Hove Orig.	206—213	175—180	...
244,200	,,	,,	8	8¼%	Do. A Ord. Stk.	154—159	130—135	...
1,272,500	Stk.	Feb. 22	5	5%	Bristol 5 p.c. max.	..	97—98	...
570,000	20	Mar. 22	12½	10/-	British A Ord.	44—45	12¼—13¼	...
10,000	10	June 28	—	7/-	Do. 7 p.c. Pref.	..	11¼—12¼	...
120,000	Stk.	,,	4	4%	Do. 4 p.c. Deb. Stk.	88—90	74—79	...
220,335	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	56—59	...
100,000	10	May 17	—	—	Cape Town & Dis., Ltd.	1¾—2¼	6¾—7¼	...
100,000	10	May 3	—	4/6	Do. 4½ p.c. Pref.	4—6	6—7	...
100,000	Stk.	June 28	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	70—75	...
237,860	,,	,,	—	7½%	Cardiff 7½ p.c. Deb.	..	106—111	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	...
1,513,280	,,	Mar. 8	5/9/4	60/-	Commercial 4 p.c. Stk.	106—108	96—99	97—97½
560,000	,,	,,	5⅛	60/-	Do. 3½ p.c. do.	103—105	95—99	97½
475,000	,,	June 14	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	56—61	...
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	37—41	...
200,000	,,	Dec. 14	7	4%	Do. 7 p.c. Pref.	113—118	72—77	74
660,000		Mar. 8	—	6%	Croydon sliding scale.	..	103—106	105
284,975		,,	—	5%	Do. max. div.	..	83—86	85—86
492,270	Stk.	—	6	4½%	Derby Con. Stk.	123—125	..	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	...
209,000	,,	Apl. 5	—	5%	East Hull 5 p.c. max.	..	..	...
1,002,180	10	July 12	10	5/0	European, Ltd.	17½—18	7⅛—8½*	7⅛—8½
16,546,120	Stk.	Feb. 8	4/17/4	52/-	{ 4 p.c. Ord	98—102	97½—99½	94⅞—99⅝
2,600,000	,,	,,	3½	35/-	Gas { 3½ p.c. max.	76—79	66—69	66—67½
4,062,235	,,	,,	4	4%	Light { 4 p.c. Con. Pref.	96—99	80—82	80½—82½
4,761,930	,,	June 14	3	3%	and { 3 p.c. Con. Deb.	72½—74½	60—63	62—63
130,000	,,	Dec. 11	10	10%	Coke { 10 p.c. Bonds	..	..	190
	—	—	—	—	{ 7½ p.c. Ilford Deb.	..	..	...
82,500	,,	Mar. 8	5	65/7½	Hastings & St. L. 5 p.c.	..	92—97	...
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	75—78	...
70,000	10	May 17	11	10%	Hongkong & China, Ltd.	16½—16¾	15—16	...
86,600	Stk.	Mar. 8	9	9½%	Hornsey 7 p.c.	..	147—152	...
1,976,000	,,	May 31	9	4/7	Imperial Continental	150—160	157—162	159—161
404,800	,,	Feb. 8	3½	3½%	Do. 3½ p.c. Deb. Red.	84—86	76—78	77
235,242	,,	Mar. 8	6¾	6¾%	Lea Bridge Ord. 5 p.c.	119—121	97—102	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.	—	..	90—90⅜
600,000	,,	Mar. 22	—	7%	,, 7 p.c. Pref.	..	107—110	...
165,736	,,	Feb. 22	7/5/6	80/-	Maidstone 5 p.c.	—	107—112	...
63,480	,,	June 28	—	3%	Do. 3 p.c. Deb	..	52—57	...
75,000	5	June 14	6	3/6	Malta & Mediterranean	4¼—4⅝	3⅝—4	...
100,000	100	Apl. 5	4½	4½%	Met. of Melbourne { 4½ p.c. Deb.	99—101	97—100	...
341,920	Stk.	May 17	4	4%	Monte Video, Ltd.	11½—12	50—55	51—53
1,875,892	,,	Feb. 22	4½	5¼%	Newcastle & Gatsh'd Con.	98½—99½	86½—87½	...
250,166	,,	,,	—	4%	Do. 4 p.c. Pref. Stk.	..	76—78	...
329,705	,,	June 28	3½	3½%	Do. 3½ p.c. Deb.	82—83	70—72	...
15,000	10	Aug. 26	—	7/6	North Middlesex 10 p.c.	..	..	...
35,940	10	Mar. 8	7/14/0	7/8⅞	,, 7 p.c.	14—15	12—13	...
300,000	Stk.	May 3	8	8%	Oriental, Ltd.	117—122	97—102	...
188,120	Stk.	June 28	—	7⅞/9	Plym'th & Stonh'se 5 p.c.	..	106—110	...
60,000	50	Mar. 8	13	65/-	Portsea Island, B	128—131	103—108	...
100,000	50	,,	12	60/-	Do. C	118—121	100—105	...
290,069	5	—	8	—	Primitiva Ord.	5⅛—6	⅛—⅜	6/-
499,960	5	—	5	—	Do. 5 p.c. Pref.	4⅝—5	1⅝—2	34/6—35/6
521,600	100	June 1	4	4%	Do. 4 p.c. Deb.	91—93	73—75	...
600,000	Stk.	Jan. 25	4	4%	Do. ,, ,, 1911	..	57—60	...
346,198	,,	June 28	4	4%	River Plate 4 p.c. Deb.	85—87	56—59	57½—58
150,000	10	Mar. 22	6	6/-	San Paulo { 6 p.c. Pref.	10½—11	5⅛—6⅛	5⅛
125,000	50	July 2	5	5%	{ 5 p.c. Deb.	47—49	37—40	...
135,000	Stk.	Mar. 22	10	5%	Sheffield A	223—224	104—106	...
209,984	,,	,,	10	5%	Do. B	222—224	104—106	...
525,500	,,	,,	10	5%	Do. C	220—222	104—106	105½
133,201	Stk.	Sept. 15	4	4%	Shrewsbury 5 p.c.	..	..	...
90,000	10	May 31	9	9/-	South African	10½—11½	8—10	...
6,609,895	Stk.	Feb. 22	5/4/0	60/-	South Met. Ord.	111—113	97½—99½	98½—99
250,000	,,	July 12	—	5%	Do. Red. Pref.	..	97—99*	...
1,895,445	,,	,,	3	3%	Do. 3 p.c. Deb.	72½—74½	61—63*	61½—62½
734,000	,,	Mar. 8	—	6½%	Do. 6½ p.c. Deb.	..	106—108	106½
91,500	,,	Feb. 22	8½	8½%	South Shields Con. Stk.	157—159	129—131	...
1,087,795	,,	,,	6	6%	S'th Suburb'n Ord. 5 p.c.	114—116	102—105	103½
368,837	,,	June 28	5	5%	Do. 5 p.c. Deb. Stk.	116—118	93—98	96
647,740	,,	May 3	5	7%	S'th'mpt'n Ord. 5 p.c. max.	99—102	88—91	89½
121,275	,,	June 28	4	4%	Do. 4 p.c. Deb. Stk.	..	72—77	...
250,000	,,	Mar. 8	—	70/-	Swansea 7 p.c. Pref. Stk.	..	103—105	...
200,000	,,	June 28	—	6½%	Do. 6½ p.c. Deb. Stk.	..	105—107	105
120,000	,,	Feb. 22	—	8%	Tottenham { A 5 p.c.	135—138	123—128	125—125½
782,275	,,	,,	6	6½%	District { B 3½ p.c.	115—117	102—107	103—104½
181,255	,,	June 14	4	4%	{ 4 p.c. Deb.	87—89	78—82	...
258,251	Stk.	Mar. 22	5	5%	Tynemouth 5 p.c. max.	108½—109	90—92	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 12	8½	90/-	Wandsworth A 5 p.c.	151—156	126—131*	...
255,636	,,	,,	6½	75/-	Do. B 3½ p.c.	129—134	112—117*	...
108,075	,,	,,	—	63/-	Do. C.	—	97—102*	...
140,865	,,	,,	—	63/-	New Ordinary	—	97—102*	...
352,000	,,	,,	6½	7/3	Wimbledon 5 p.c.	117—122	109—114*	111
98,000	,,	,,	6½	76/3	Epsom 5 p.c.	121—126	112—117*	...
88,416	,,	June 28	3	3%	3 p.c Deb. Stk.	66—69	57—60	...

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Reduction at Kirkham.—The Kirkham Gas Company announce a reduction of 3d. per 1000 c.ft. in the price of gas, commencing from the quarter ended June.

Cheaper Gas at Congleton.—Upon the recommendation of Mr. W. A. Cartwright (the Gas Manager), the Gas Committee of the Congleton Town Council have decided to reduce the price of gas by 4d. per 1000 c.ft., making the charge to the ordinary consumer 3s. 11d.

Forfar Gas Price Reduced.—The price of gas in Forfar has been reduced 7d. per 1000 c.ft., as from May 15. This makes the price of gas for the current year in the burgh 3s. 6d. per 1000 c.ft., and for power purposes 3s. 3d. Slot-meter consumers will pay 3s. 11d. per 1000 c.ft.

Reduction in Price at Driffield.—The Driffield Urban District Council have decided to reduce the price of gas by 5d. per 1000 c.ft.; an equivalent allowance being made to slot-meter users. The discount to power consumers remains at 10 p.ct. The price to ordinary consumers is now 4s. 2d. per 1000 c.ft.

Brechin Gas Company.—Moving the adoption of the report and balance-sheet at the annual meeting of the Company, Mr. T. Maule Guthrie, M.P., said that the year had been a fairly prosperous one. The price of gas had been reduced 10d. per 1000 c.ft. The coming year might not be so easy, owing to the situation in the Ruhr, which affected the coal position.

Lichfield Public Lighting.—In connection with the public lighting at Lichfield, a communication from the Gas Company was read at a meeting of the City Council last week. As the result of negotiation, the Directors had offered a total reduction, as compared with last year, of £82 1s. The Streets Committee expressed their thanks to the Directors, and recommended that the offer be accepted. This was agreed to.

Hull Gas Undertaking.—The offer of the British Gaslight Company to negotiate with the Hull Corporation for the purchase of the gas undertaking in the old town has been considered by a special committee; and at a recent meeting of the Corporation Water and Gas Committee, it was recommended that negotiations be not entered into for the sale of the undertaking. This recommendation was confirmed.

Parkinson and W. & B. Cowan.—The accounts of Messrs. Parkinson and W. & B. Cowan, Ltd., for the past year show a net profit of £55,323, and £2535 brought forward. The Directors recommend a final dividend on the ordinary shares of 5½ p.ct., subject to tax, making 8 p.ct., that £1500 be placed to the benevolent fund, £5460 transferred to goodwill account, and £3737 carried forward, subject to corporation tax. The Company, who in 1921 acquired an interest in Measurement, Ltd., have taken over on favourable terms the remaining issued share capital of that Company.

Subscribing Capital to Contiguous Gas Companies.—The Parliamentary Committee of the London County Council report that they have had under consideration the Brentford Gas Company's Special Order, for which application has been made to the Board of Trade. The main purpose of the Order is to transfer to the Company the undertakings of the Harrow and Stanmore and the Richmond Gas Companies. The Committee were advised that the terms of the transfer did not appear to be unreasonable. Provision is made in the Order to enable the Company to subscribe towards the capital of, or to lend money to, any gas company carrying on an undertaking in any district contiguous or near to the Brentford limits of supply. The Committee are not aware of any such powers in the Acts of gas companies supplying in London, but were advised that the proposal was not one to which the Council had grounds for objection; and after consultation with the Public Control Committee, they decided not to take any action on the Order.

Cheaper Gas at Kirriemuir.—Notwithstanding a considerable increase in the contract price of coal for the ensuing year, at the annual general meeting of the Kirriemuir Gas Company, Ltd., it was resolved to reduce the price of gas by 7d. per 1000 c.ft. Mr. Ogilvy, of Lisden, presided; and a dividend of 8 p.ct., with a bonus of 2 p.ct., free of income-tax, was declared.

Gas Testing at Sheffield.—The declared value of the Sheffield Gas Company's supply is 500 B.Th.U.; and the report of the Gas Examiner for the quarter to June 30 shows that the average calorific value over that period was 520·7 B.Th.U. Sulphuretted hydrogen was not present in the gas; and there were no tests in which the pressure was less than the standard.

Accident at Bradford Gas-Works.—An unfortunate accident occurred at the Birkshall Gas-Works of the Bradford Corporation last week, resulting in the death of a workman and injury to two others. William Huggins, Rhodes Crabtree, and John Lacey were working on a scaffold, repairing a coal conveyor, when a chain on which they were pulling broke, and the three men were thrown to the ground 30 ft. below. Lacey died in the infirmary, Crabtree was detained with spinal injuries, and Huggins was given first aid and allowed to go home.

Public Lighting of Budleigh Salterton.—Disapproval was expressed at a meeting of the Budleigh Salterton Urban District Council of the price charged by the local Gas Company; a councillor declaring that if the Company could not reduce the price of gas the town had better be without street-lamps. Mr. E. Barrett moved that the Company's tender of £3 16s. 3d. per lamp for lighting 70 lamps for seven months during the winter be accepted. The Chairman (Mr. H. V. Hooker) said they had no alternative; and he would vote for the proposition against his own wish. Mr. Burch was of opinion that they would not get any other Company to undertake the contract for less; and the proposition was carried.

Boston Gas Company.—A satisfactory report as to the result of the past year's working (and embodying also an intimation of a reduction of 5d. per 1000 c.ft. for gas as from the last readings of the meters) was presented at the annual meeting of the Boston Gas Light and Coke Company, which was held on Thursday last, under the presidency of Alderman T. Kitwood, J.P. The net profit for the twelve months amounted to £2393, after writing-off £677 for depreciation. The balance standing to the credit of the profit and loss account, after payment of the interim dividend in February, was £4493, out of which the Directors recommended payment of the full parliamentary dividends on both classes of shares, leaving £3444 to be carried forward. The quantity of gas sold during the year was 113,430,000 c.ft., an increase of 3,878,300 c.ft. It is intended to introduce the therm system of charges from the November meter readings, and to mark the occasion by a further reduction in the price. In moving the adoption of the report, which was agreed to, the Chairman said that the introduction of the mechanical stoker at the works had led to a great diminution in labour cost, while carbonization had been rendered more effective.

Intimation has been received from Palmer's Publicity Service that, in order to cope with increased business, they have removed their offices from Nos. 132/4, Fleet Street to larger premises at No. 69.

The Bradford Corporation Finance Advisory and Co-ordination Committee—a body whose authority on all financial matters is exceeded only by that of the full Council—have approved a recommendation by the Gas Committee that the sum of £5000 should be allocated for the purpose of replacing old, or laying new, gas-mains as required; the grant of £5000, approved in January last, being exhausted.

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